PROGRAMME EDUCATIONAL OBJECTIVES (PEOS) – B.E. CIVIL ENGG.,

I. To prepare students for successful careers in soil mechanics and foundation engineering field that meets the needs of Indian and multinational companies.

II. To develop the confidence and ability among students to synthesize data and technical concepts and thereby apply it in real world problems.

III. To develop students to use modern techniques, skill and mathematical engineering tools for solving problems in soil mechanics and foundation engineering.

IV. To provide students with a sound foundation in mathematical, scientific and engineering fundamentals necessary to formulate, solve and analyse engineering problems and to prepare them for graduate studies.

V. To promote students to work collaboratively on multi-disciplinary projects and make them engage in life-long learning process throughout their professional life.

PROGRAMME OUTCOMES (B.E. - CIVIL)

a) Graduates will demonstrate basic knowledge in mathematics, science and engineering.

b) Graduates will demonstrate the ability to design and conduct experiment, interpret and analyse data and report results.

c) Graduates will demonstrate the ability to design basic structural elements or a structure that meets desired specifications and requirements.

d) Graduates will demonstrate the ability to function on engineering and science laboratory teams as well as on multidisciplinary design team.

e) Graduate will demonstrate the ability to identify, formulate, and solve civil engineering problems.

f) Graduate will demonstrate an understanding of their professional ethical responsibilities.

g) Graduate will be able to communicate effectively in both verbal and written form.

h) Graduate will have confidence to apply engineering solutions in global and societal context.

i) Graduate should be capable of self education and clearly understand the value of lifelong learning.
j) Graduate will be broadly educated and will have an understanding of the impact of engineering on society and demonstrate awareness of contemporary issues.

k) Graduate will be familiar with modern engineering, software tools, and equipment to analyse civil engineering problems.

**PEOs & POs**

The B.E. Civil Engineering Program outcomes leading to the achievement of the objectives are summarized in the following Table.

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# I - VIII SEMESTERS CURRICULA AND SYLLABI
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<td><strong>GROUP IV – ENVIRONMENTAL ENGINEERING</strong></td>
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<td>GE 8751</td>
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<td>AI 8452</td>
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<td>GI 8751</td>
<td>Digital Cadastre</td>
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* The students should not take more than one elective course from each group.
OBJECTIVES:
- To enable all students of engineering and technology develop their basic communication skills in English.
- To give special emphasis to the development of speaking skills amongst the students of engineering and technology students.
- To ensure that students use the electronic media such as internet and supplement the learning materials used in the classroom.
- To inculcate the habit of reading for pleasure.

UNIT I
Listening - Introducing learners to GIE - Types of listening - Listening to audio (verbal & sounds); Speaking - Speaking about one’s place, important festivals etc. – Introducing oneself, one’s family / friend; Reading - Skimming a reading passage – Scanning for specific information - Note-making; Writing - Free writing on any given topic (My favourite place / Hobbies / School life, etc.) - Sentence completion - Autobiographical writing (writing about one’s leisure time activities, hometown, etc.); Grammar - Prepositions - Reference words - Wh-questions - Tenses (Simple); Vocabulary - Word formation - Word expansion (root words / etymology); E-materials - Interactive exercises for Grammar & Vocabulary - Reading comprehension exercises - Listening to audio files and answering questions.

UNIT II
Listening - Listening and responding to video lectures / talks; Speaking - Describing a simple process (filling a form, etc.) - Asking & answering questions - Telephone skills – Telephone etiquette; Reading – Critical reading - Finding key information in a given text - Sifting facts from opinions; Writing - Biographical writing (place, people) - Lab descriptions (general/specific description of laboratory experiments) - Definitions - Recommendations; Grammar - Use of imperatives - Subject-verb agreement; Vocabulary - Compound words - Word Association; E-materials - Interactive exercises for Grammar and Vocabulary - Listening exercises with sample telephone conversations / lectures – Picture-based activities.

UNIT III
Listening - Listening to specific task - focused audio tracks; Speaking - Role-play – Simulation - Group interaction - Speaking in formal situations (teachers, officials, foreigners); Reading - Reading and interpreting visual material; Writing - Jumbled sentences - Coherence and cohesion in writing - Channel conversion (flowchart into process) - Types of paragraph (cause & effect / compare & contrast / narrative / analytical) - Informal writing (letter/e-mail/blogs) Paraphrasing; Grammar - Tenses (Past) - Use of sequence words - Adjectives; Vocabulary - Different forms and uses of words, Cause and effect words; E-materials - Interactive exercises for Grammar and Vocabulary - Excerpts from films related to the theme and follow up exercises - Pictures of flow charts and tables for interpretations.

UNIT IV
Listening - Watching videos / documentaries and responding to questions based on them; Speaking - Responding to questions - Different forms of interviews - Speaking at different types of interviews; Reading - Making inference from the reading passage - Predicting the content of a reading passage; Writing - Interpreting visual materials (line graphs, pie charts etc.) - Essay writing – Different types of essays; Grammar - Adverbs – Tenses – future time reference; Vocabulary - Single word substitutes - Use of abbreviations & acronyms; E-materials - Interactive exercises for Grammar and Vocabulary - Sample interviews - film scenes - dialogue writing.
UNIT V

Listening - Listening to different accents, Listening to Speeches/Presentations, Listening to broadcast & telecast from Radio & TV; Speaking - Giving impromptu talks, Making presentations on given topics; Reading - Email communication - Reading the attachment files having a poem/joke/proverb - Sending their responses through email Writing - Creative writing, Poster making; Grammar - Direct and indirect speech; Vocabulary - Lexical items (fixed / semi fixed expressions); E-materials - Interactive exercises for Grammar & Vocabulary - Sending emails with attachment – Audio / video excerpts of different accents, - Interpreting posters.

TOTAL: 60 PERIODS

OUTCOMES:
Learners should be able to
- speak clearly, confidently, comprehensibly, and communicate with one or many listeners using appropriate communicative strategies.
- write cohesively and coherently and flawlessly avoiding grammatical errors, using a wide vocabulary range, organizing their ideas logically on a topic.
- read different genres of texts adopting various reading strategies.
- listen/view and comprehend different spoken discourses/excerpts in different accents

TEXTBOOKS:

REFERENCES:

EXTENSIVE READERS:

Website Resources
1. www.uefap.com
2. www.eslcafe.com
3. www.listen-to-english.com
4. www.owl.english.purdue.edu
5. www.chompchomp.com
OBJECTIVES:
- To develop the use of matrix algebra techniques this is needed by engineers for practical applications.
- To make the student knowledgeable in the area of infinite series and their convergence so that he/she will be familiar with limitations of using infinite series approximations for solutions arising in mathematical modeling.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To introduce the concepts of improper integrals, Gamma, Beta and Error functions which are needed in engineering applications.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.

UNIT I MATRICES

UNIT II INFINITE SERIES

UNIT III FUNCTIONS OF SEVERAL VARIABLES

UNIT IV IMPROPER INTEGRALS

UNIT V MULTIPLE INTEGRALS

TOTAL: 60 PERIODS

OUTCOMES:
- This course equips students to have basic knowledge and understanding in one fields of materials and integral

TEXTBOOKS:
REFERENCES:

PH8151 ENGINEERING PHYSICS
(Common to all branches of B.E / B.Tech programmes)

OBJECTIVE:
- To introduce the basic physics concepts relevant to different branches of Engineering and Technology.

UNIT I PROPERTIES OF MATTER

UNIT II ACOUSTICS AND ULTRASONICS

UNIT III THERMAL PHYSICS

UNIT IV APPLIED OPTICS
UNIT V SOLID STATE PHYSICS
Nature of bonding - growth of single crystals (qualitative) - crystal systems - crystal planes and directions - expressions for interplanar distance - coordination number and packing factor for simple structures: SC, BCC, FCC and HCP - structure and significance of NaCl, ZnS, diamond and graphite - crystal imperfections: point defects, dislocations and stacking faults - unit cell, Bravais space lattices - miller indices.

TOTAL: 45 PERIODS

OUTCOMES:
- The students will have knowledge on the basics of physics related to properties of matter, optics, acoustics etc., and they will apply these fundamental principles to solve practical problems related to materials used for engineering applications.

TEXTBOOKS:

REFERENCES:

OBJECTIVES:
- To make the students conversant with basics of polymer chemistry.
- To make the student acquire sound knowledge of second law of thermodynamics and second law based derivations of importance in engineering applications in all disciplines.
- To acquaint the student with concepts of important photophysical and photochemical processes and spectroscopy.
- To acquaint the students with the basics of nano materials, their properties and applications.

UNIT I CHEMICAL THERMODYNAMICS
Second law: Entropy - entropy change for an ideal gas, reversible and irreversible processes; entropy of phase transitions; Clausius inequality. Free energy and work function: Helmholtz and Gibbs free energy functions; Criteria of spontaneity; Gibbs-Helmholtz equation; Clausius-Clapeyron equation; Maxwell relations – Van’t Hoff isotherm and isochore. Chemical potential; Gibbs-Duhem equation – variation of chemical potential with temperature and pressure.

UNIT II POLYMER CHEMISTRY
Introduction: Classification of polymers – Natural and Synthetic; Thermoplastic and Thermosetting. Functionality – Degree of polymerisation. Types and mechanism of polymerisation: Addition (Free Radical, cationic, anionic and living); condensation and copolymerisation. Properties of polymers: Tg, Tacticity, Molecular weight – weight average, number average and polydispersity index. Techniques of polymerisation: Bulk, emulsion, solution and suspension.
UNIT III KINETICS AND CATALYSIS


UNIT IV PHOTOCHEMISTRY AND SPECTROSCOPY


UNIT V NANOCHEMISTRY


OUTCOMES:

- The knowledge gained on polymer chemistry, thermodynamics, spectroscopy, kinetics and nano materials will provide a strong platform to understand the concepts on these subjects for further learning.

TEXTBOOKS:


REFERENCES:


GE8151 COMPUTING TECHNIQUES

OBJECTIVES: The students should be made to:
- Learn the organization of a digital computer.
- Be exposed to the number systems.
- Learn to think logically and write pseudo code or draw flow charts for problems.
- Be exposed to the syntax of C.
- Be familiar with programming in C.
- Learn to use arrays, strings, functions, pointers, structures and unions in C.
UNIT I INTRODUCTION

UNIT II C PROGRAMMING BASICS

UNIT III ARRAYS AND STRINGS

UNIT IV FUNCTIONS AND POINTERS

UNIT V STRUCTURES AND UNIONS
Introduction – need for structure data type – structure definition – Structure declaration – Structure within a structure - Union - Programs using structures and Unions – Storage classes, Pre-processor directives.

TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course, the student should be able to:
- Design C Programs for problems.
- Write and execute C programs for simple applications.

TEXTBOOKS:

REFERENCES:

GE 8152 ENGINEERING GRAPHICS

OBJECTIVES:
- To develop in students, graphic skills for communication of concepts, ideas and design of engineering products
- To expose them to existing national standards related to technical drawings.
CONCEPTS AND CONVENTIONS (Not for Examination)

Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

UNIT I  PLANE CURVES AND FREE HAND SKETCHING  5+9

Visualization concepts and Free Hand sketching; Visualization principles – Representation of Three Dimensional objects – Layout of views- Free hand sketching of multiple views from pictorial views of objects

UNIT II  PROJECTION OF POINTS, LINES AND PLANE SURFACES  5+9
Orthographic projection- principles-Principal planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method and trapezoidal method and traces Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

UNIT III  PROJECTION OF SOLIDS  5+9
Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes by rotating object method and auxiliary plane method.

UNIT IV  PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES  5+9
Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones. Development of lateral surfaces of solids with cut-outs and holes

UNIT V  ISOMETRIC AND PERSPECTIVE PROJECTIONS  6+9
Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions and miscellaneous problems. Perspective projection of simple solids- Prisms, pyramids and cylinders by visual ray method and vanishing point method.

COMPUTER AIDED DRAFTING (Demonstration Only)  3
Introduction to drafting packages and demonstration of their use.

TOTAL (L:30+P:45):75 PERIODS

OUTCOMES: On Completion of the course the student will be able to

- perform free hand sketching of basic geometrical constructions and multiple views of objects.
- do orthographic projection of lines and plane surfaces.
- draw projections and solids and development of surfaces.
- prepare isometric and perspective sections of simple solids.
- demonstrate computer aided drafting
**TEXTBOOK:**

**REFERENCES:**

**Publication of Bureau of Indian Standards:**

**Special points applicable to University Examinations on Engineering Graphics:**
1. There will be five questions, each of either or type covering all units of the syllabus.
2. All questions will carry equal marks of 20 each making a total of 100.
3. The answer paper shall consist of drawing sheets of A3 size only.
   The students will be permitted to use appropriate scale to fit solution within A3 size.
4. The examination will be conducted in appropriate sessions on the same day.

**PH 8161 PHYSICS LABORATORY**
(Common to all branches of B.E. / B.Tech. Programmes)

**OBJECTIVES:**
- To introduce different experiments to test basic understanding of physics concepts applied in optics, thermal physics, properties of matter and liquids.

1. Torsional pendulum: Determination of rigidity modulus of wire and moment of inertia of disc.
3. Lee’s disc: Determination of thermal conductivity of a bad conductor.
4. Potentiometer: Determination of thermo e.m.f. of thermocouple.
5. Air wedge: Determination of thickness of a thin sheet of paper.
6. i. Optical fibre: Determination of Numerical Aperture and acceptance angle.
   ii. Compact disc: Determination of width of the groove using laser.

**TOTAL: 30 PERIODS**
OUTCOMES:
- The hands on exercises undergone by the students will help them to apply physics principles of optics and thermal physics to evaluate engineering properties of materials.

CY 8161 CHEMISTRY LABORATORY
(Common to all branches of Engineering and Technology)

OBJECTIVES:
- To make the student to acquire practical skills in the determination of water quality parameters through volumetric and instrumental analysis.
- To acquaint the students with the determination of molecular weight of a polymer by vacometry.
1. Estimation of HCl using Na2CO3 as primary standard and Determination of alkalinity in water sample.
2. Determination of total, temporary & permanent hardness of water by EDTA method.
3. Determination of DO content of water sample by Winkler’s method.
4. Determination of chloride content of water sample by argentometric method.
5. Estimation of copper content of the given solution by iodometry.
6. Determination of strength of given hydrochloric acid using pH meter.
7. Determination of strength of acids in a mixture of acids using conductivity meter.
8. Estimation of iron content of the given solution using potentiometer.
9. Estimation of iron content of the water sample using spectrophotometer (1,10-phenanthroline / thiocyanate method).
10. Estimation of sodium and potassium present in water using flame photometer.
14. Determination of CMC.
15. Phase change in a solid.

TOTAL: 30 PERIODS

OUTCOMES:
- The students will be outfitted with hands-on knowledge in the quantitative chemical analysis of water quality related parameters.

REFERENCES:
GE8161 COMPUTER PRACTICES LABORATORY

OBJECTIVES: The student should be made to:
- Be familiar with the use of Office software.
- Be exposed to presentation and visualization tools.
- Be exposed to problem solving techniques and flow charts.
- Be familiar with programming in C.
- Learn to use Arrays, strings, functions, structures and unions.

LIST OF EXPERIMENTS:
1. Search, generate, manipulate data using MS office/Open office
2. Presentation and visualization - graphs, charts, tables, 2D, 3D.
5. String manipulations in C.
7. Solving numerical problems using C.
8. Using Structures and Unions in C.

LABORATORY REQUIREMENTS FOR BATCH OF 30 STUDENTS

Hardware: 30 Terminals
Software:
1. MS Office / Open Office software
2. C-Compiler
3. MATLAB 7 / Octave 3 / Scilab 5
4. Processing 1.5

TOTAL: 45 PERIODS

OUTCOMES: At the end of the course, the student should be able to:
- Apply good programming design methods for program development.
- Design and implement C programs for simple applications.
- Develop recursive programs.

GE 8162 ENGINEERING PRACTICES LABORATORY (Common to all Branches of B.E. / B.Tech. Programmes)

OBJECTIVE
- To provide exposure to the students with hands-on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.

GROUP – A (CIVIL & ELECTRICAL)

1. CIVIL ENGINEERING PRACTICE

Plumbing
Basic pipe connections involving the fittings like valves, taps, coupling, unions, reducers, elbows and other components used in household fittings. Preparation of plumbing line sketches.
Laying pipe connection to the suction side of a pump – inlet. Laying pipe connection to the delivery side of a pump – outlet.
Practice in mixed pipe connections: Metal, plastic and flexible pipes used in household appliances.

Wood Work
Sawing, planning and making common joints: T-Joint, Mortise and Tennon joint, Dovetail joint.

Study
Study of joints in door panels, wooden furniture Study of common industrial trusses using models.

2. ELECTRICAL ENGINEERING PRACTICE

Basic household wiring using switches, fuse, indicator – lamp etc., Preparation of wiring diagrams
Staircase light wiring
Tube – light wiring

Study of iron-box, fan with regulator, emergency lamp

GROUP – B (MECHANICAL AND ELECTRONICS)

3. MECHANICAL ENGINEERING PRACTICE

Welding
Arc welding of butt joints, lap joints, tee joints

Gas welding Practice. Basic Machining
Simple turning, drilling and tapping operations. Machine assembly Practice.
Study and assembling the following: Centrifugal pump, mixies and air conditioners.
Demonstration on Smithy operations like the production of hexagonal bolt. Foundry operation like mould preparation for grooved pulley.

4. ELECTRONIC ENGINEERING PRACTICE

Soldering simple electronic circuits and checking continuity. Assembling electronic components on a small PCB and testing.
Study of Telephone, FM radio, low-voltage power supplies.

OUTCOMES:
- ability to fabricate carpentry components and pipe connections including plumbing works.
- ability to use welding equipments to join the structures.
- ability to fabricate electrical and electronics circuits.

TOTAL: 45 PERIODS

HS 8251 TECHNICAL ENGLISH – II
(For all branches of B.E / B.Tech programmes)

OBJECTIVES:
- To make the students acquire listening and speaking skills meant for both formal and informal contexts
- To help them develop their reading skills by exposing them to different types of reading strategies
- To equip them with writing skills needed for academic as well as workplace situations
- To make them acquire language skills at their own pace by using e-materials and language lab component
UNIT I
Listening - Listening to informal conversations and participating; Speaking - Opening a conversation (greetings, comments on something, weather) - Turn taking - Closing a conversation (excuses, general wish, positive comment, thanks); Reading - Developing analytical skills, Deductive and inductive reasoning - Extensive reading; Writing - Effective use of SMS for sending short notes and messages - Using 'emoticons' as symbols in email messages; Grammar - Regular & irregular verbs - Active and passive voice; Vocabulary - Homonyms (e.g. 'can') - Homophones (e.g. 'some', 'sum'); E-materials - Interactive exercise on Grammar and vocabulary – blogging; Language Lab - Listening to different types of conversation and answering questions.

UNIT II
Listening - Listening to situation based dialogues; Speaking - Conversation practice in real life situations, asking for directions (using polite expressions), giving directions (using imperative sentences), Purchasing goods from a shop, Discussing various aspects of a film (they have already seen) or a book (they have already read); Reading - Reading a short story or an article from newspaper, Critical reading, Comprehension skills; Writing - Writing a review / summary of a story / article, Personal letter (Inviting your friend to a function, congratulating someone for his success, thanking one’s friend / relatives); Grammar - modal verbs, Purpose expressions; Vocabulary - Phrasal verbs and their meanings, Using phrasal verbs in sentences; E-materials - Interactive exercise on Grammar and vocabulary, Extensive reading activity (reading stories / novels from links), Posting reviews in blogs - Language Lab - Dialogues (Fill up exercises), Recording students' dialogues.

UNIT III
Listening - Listening to the conversation - Understanding the structure of conversations; Speaking - Conversation skills with a sense of stress, intonation, pronunciation and meaning - Seeking information – expressing feelings (affection, anger, regret etc.); Reading - Speed reading – reading passages with the time limit - Skimming; Writing - Minutes of meeting – format and practice in the preparation of minutes - Writing summary after reading the articles from the journals - Format for the journal articles – elements of technical articles (abstract, introduction, methodology, results, discussion, conclusion, appendices, references) - Writing strategies; Grammar - Conditional clauses - Cause and effect expressions; Vocabulary - Words used as nouns and verbs without any change in the spelling (e.g. 'rock', 'train', 'ring'); E-materials - Interactive exercise on Grammar & vocabulary - Speed Reading practice exercises; Language Lab - Intonation practice using EFLU materials – Attending a meeting and writing minutes.

UNIT IV
Listening - Listening to a telephone conversation, Viewing a model interview (face-to-face, telephonic and video conferencing) and observing the practices; Speaking - Role play practice in telephone skills - listening and responding, -asking questions, -note taking – passing on messages, Role play and mock interview for grasping the interview skills; Reading - Reading the job advertisements and the profile of the company concerned – scanning; Writing - Applying for a job – cover letter - résumé preparation – vision, mission and goals of the candidate; Grammar - Numerical expressions - Connectives (discourse markers); Vocabulary - Idioms and their meanings – using idioms in sentences; E-materials - Interactive exercises on Grammar & Vocabulary - Different forms of résumés- Filling up a résumé / cover letter; Language Lab - Telephonic interview – recording the responses - e-résumé writing.

UNIT V
Listening - Viewing a model group discussion and reviewing the performance of each participant - Identifying the characteristics of a good listener; Speaking - Group discussion skills – initiating the discussion – exchanging suggestions and proposals – expressing dissent
agreement – assertiveness in expressing opinions – mind mapping technique; Reading - Note making skills – making notes from books, or any form of written materials - Intensive reading Writing - Types of reports – Feasibility / Project report – report format – recommendations / suggestions – interpretation of data (using charts for effective presentation); Grammar - Use of clauses; Vocabulary – Collocation; E-materials - Interactive grammar and vocabulary exercises - Sample GD - Pictures for discussion, Interactive grammar and vocabulary exercises - Pictures for discussion; Language Lab - Different models of group discussion

TOTAL: 60 PERIODS

OUTCOMES: Learners should be able to

- speak convincingly, express their opinions clearly, initiate a discussion, negotiate, argue using appropriate communicative strategies.
- write effectively and persuasively and produce different types of writing such as narration, description, exposition and argument as well as creative, critical, analytical and evaluative writing.
- read different genres of texts, infer implied meanings and critically analyse and evaluate them for ideas as well as for method of presentation.
- listen/view and comprehend different spoken excerpts critically and infer unspoken and implied meanings.

TEXTBOOKS:

REFERENCES:

EXTENSIVE READERS:

WEB RESOURCES:
1. www.esl-lab.com
2. www.englishgrammar.org
3. www.englishclub.com
4. www.mindtools.com
5. www.esl.about.com
**MA 8251 MATHEMATICS – II**
(Common to all branches of B.E. / B.Tech. Programmes in II Semester) **3 1 0 4**

**OBJECTIVES:**
- To make the student acquire sound knowledge of techniques in solving ordinary differential equations that model engineering problems.
- To acquaint the student with the concepts of vector calculus, needed for problems in all engineering disciplines.
- To develop an understanding of the standard techniques of complex variable theory so as to enable the student to apply them with confidence, in application areas such as heat conduction, elasticity, fluid dynamics and flow the of electric current.
- To make the student appreciate the purpose of using transforms to create a new domain in which it is easier to handle the problem that is being investigated.

**UNIT I DIFFERENTIAL EQUATIONS**
9+3
Method of variation of parameters – Method of undetermined coefficients – Homogenous equation of Euler’s and Legendre’s type – System of simultaneous linear differential equations with constant coefficients.

**UNIT II VECTOR CALCULUS**
9+3
Gradient and directional derivative – Divergence and Curl – Irrotational and Solenoidal vector fields – Line integral over a plane curve – Surface integral and volume integral - Green’s, Gauss divergence and Stoke’s theorems – Verification and application in evaluating line, surface and volume integrals.

**UNIT III ANALYTIC FUNCTION**
9+3
Analytic functions – Necessary and sufficient conditions for analyticity - Properties – Harmonic conjugates – Construction of analytic function - Conformal mapping – Mapping by functions \( w = z + c, az, 1/z, z^2 \) - Bilinear transformation.

**UNIT IV COMPLEX INTEGRATION**
9+3

**UNIT V LAPLACE TRANSFORMS**
9+3

**OUTCOMES:**
- The subject helps the students to develop the fundamentals and basic concepts in vector calculus, ODE, Laplace transform and complex functions. Students will be able to solve problems related to engineering applications by using these techniques.

**TEXTBOOKS:**
REFERENCES:

PH 8203  PHYSICS FOR CIVIL ENGINEERING  L T P C  3 0 0 3

OBJECTIVES:
- To teach the essential principles of physics for civil engineering applications such as acoustical, thermal, air conditioning, etc. and also to introduce importance of new engineering materials.

UNIT I  THERMAL APPLICATIONS  9

UNIT II  VENTILATION AND REFRIGERATION  9
Requirements, principles of natural ventilation - ventilation measurements, design for natural ventilation - Window types and packaged air conditioners - chilled water plant - fan coil systems - water piping - cooling load - Air conditioning systems for different types of buildings - Protection against fire to be caused by A.C.Systems.

UNIT III  ACOUSTICS AND LIGHTING DESIGNS  9
Methods of sound absorptions - absorbing materials - noise and its measurements, sound insulation and its measurements, impact of noise in multi-storeyed buildings. Visual field glare, colour - day light calculations - day light design of windows, measurement of day-light and use of models and artificial skies, principles of artificial lighting, supplementary artificial lighting.

UNIT IV  NEW ENGINEERING MATERIALS  9
Composites - Definition and Classification - Fibre reinforced plastics (FRP) and fiber reinforced metals (FRM) - Metallic glasses - Shape memory alloys - Ceramics - Classification - Crystalline - Non Crystalline - Bonded ceramics, Manufacturing methods - Slip casting - Isostatic pressing - Gas pressure bonding - Properties - thermal, mechanical, electrical and chemical ceramic fibres - ferroelectric and ferromagnetic ceramics - High Aluminium ceramics.

UNIT V  HAZARDS  9
Seismology and Seismic waves - Earth quake ground motion - Basic concepts and estimation techniques - site effects - Probabilistic and deterministic Seismic hazard analysis - Cyclone and flood hazards - Fire hazards and fire protection, fire-proofing of materials, fire safety regulations and fire fighting equipment - Prevention and safety measures.

TOTAL: 45 PERIODS
OUTCOMES:

- The students will have the knowledge on physics related to Civil Engineering and that knowledge will be used by them in Various applications.

REFERENCES:


CY 8251 CHEMISTRY FOR CIVIL AND AGRICULTURAL ENGINEERING

OBJECTIVES:

- To make the students conversant with boiler feed water requirements, related problems and water treatment techniques.
- Principles of electrochemical reactions, redox reactions in corrosion of materials and methods for corrosion prevention and protection of materials.
- Principles and generation of energy in batteries, nuclear reactors, solar cells, wind mills and fuel cells.
- Preparation, properties and applications of engineering materials.
- Types of fuels, calorific value calculations, manufacture of solid, liquid and gaseous fuels.

UNIT I CHEMISTRY OF BUILDING MATERIALS


UNIT II CORROSION AND ITS CONTROL

UNIT III ADHESIVES AND COMPOSITES


UNIT IV ABRASIVES, AND REFRACTORIES

Abrasives: definition, classification or types, grinding wheel, abrasive paper and cloth. Refractories: definition, characteristics, classification, properties – refractoriness and RUL, dimensional stability, thermal spalling, thermal expansion, porosity; Manufacture of refractories – general method; acidic refractories – fire clay, silica; basic refractories – magnesite, dolomite; neutral refractories – silicon carbide, zircon.

UNIT V WATER AND INSTRUMENTAL ANALYSIS

Properties of water, sources, quality for different uses-significance of water quality parameter Ph, EC, TDS, Hardness, chloride, sulphate, iron, fluoride, nitrate, BOD, COD, and heavy metals (As, Hg, Cr, Pb) and their determination by titrimetry, electrometry, UV-visible, AAS, ICP-AES, softening of water by ion exchange method, municipal water treatment, principle, coagulations, and filtration, and disinfection. Desalination by reverse osmosis method.

OUTCOMES:

- The knowledge gained on engineering materials, fuels, energy sources and water treatment techniques will facilitate better understanding of engineering processes and applications for further learning.

TEXTBOOKS:


REFERENCES:


GE 8251 ENGINEERING MECHANICS

OBJECTIVE:

- To develop capacity to predict the effect of force and motion in the course of carrying out the design functions of engineering

UNIT I BASICS AND STATICS OF PARTICLES

UNIT II  EQUILIBRIUM OF RIGID BODIES  9 + 3
Free body diagram – Types of supports – Action and reaction forces – Stable equilibrium – Moments and Couples – Moment of a force about a point and about an axis – Vectorial representation of moments and couples – Scalar components of a moment – Varignon’s theorem – Single equivalent force - Equilibrium of Rigid bodies in two dimensions – Equilibrium of Rigid bodies in three dimensions

UNIT III  PROPERTIES OF SURFACES AND SOLIDS  9 + 3

UNIT IV  DYNAMICS OF PARTICLES  9 + 3

UNIT V  FRICTION AND ELEMENTS OF RIGID BODY DYNAMICS  9 + 3
Friction force – Laws of sliding friction – equilibrium analysis of simple systems with sliding friction – wedge friction – Rolling resistance - Translation and Rotation of Rigid Bodies – Velocity and acceleration – General Plane motion of simple rigid bodies such as cylinder, disc/wheel and sphere.

TOTAL (L : 45 + T : 15) : 60 PERIODS

OUTCOMES:
- ability to explain the differential principles applies to solve engineering problems dealing with force, displacement, velocity and acceleration.
- ability to analyse the forces in any structures.
- ability to solve rigid body subjected to dynamic forces.

TEXTBOOKS:

REFERENCES:
OBJECTIVE:
- To introduce students to various materials commonly used in civil engineering construction and their properties.

UNIT I STONES – BRICKS – CONCRETE BLOCKS

UNIT II LIME – CEMENT – AGGREGATES – MORTAR

UNIT III CONCRETE

UNIT IV TIMBER AND OTHER MATERIALS

UNIT V MODERN MATERIALS

TOTAL: 45 PERIODS

OUTCOMES: On completion of this course the students will be able to
- compare the properties of most common and advanced building materials.
- understand the typical and potential applications of these materials
- understand the relationship between material properties and structural form
- understand the importance of experimental verification of material properties.

TEXTBOOKS:
REFERENCES:
2. Relevant Indian Standard Codes of Practice
5. IS383–1970: Indian Standard specification for coarse and fine aggregate from natural sources for concrete

CE 8211 CONSTRUCTION MATERIALS LABORATORY L T P C
0 0 3 2

OBJECTIVE:
- To facilitate the understanding of the behavior of construction materials.

I. TEST ON CEMENT
1. Determination of fineness
2. Determination of consistency
3. Determination of initial and final setting time
4. Estimation of Chemical Composition / Reaction of Cement (This experiment to be carried out at the Centre for Environmental Studies)

II. TEST ON FINE AGGREGATES
4. Grading of fine aggregates
5. Test for specific gravity and test for bulk density
6. Compacted and loose bulk density of fine aggregate

III. TEST ON BRICKS
7. Test for compressive strength
8. Test for Water absorption
9. Determination of Efflorescence

IV. TEST ON COARSE AGGREGATE
10. Determination of impact value of coarse aggregate
11. Determination of elongation index
12. Determination of flakiness index
13. Determination of aggregate crushing value of coarse aggregate

V. TEST ON CONCRETE
14. Test for slump
15. Test for Compressive strength

TOTAL: 30 PERIODS

OUTCOMES:
- The students will have the required knowledge in the area of testing of construction materials and components of construction elements experimentally.

REFERENCES:
4. IS 4031 (Part 5) – 1988 – Indian Standard methods for Determination of initial and final setting times

MA8357 TRANSFORM TECHNIQUES AND PARTIAL DIFFERENTIAL EQUATIONS L T P C 3 1 0 4

OBJECTIVES:
- To introduce the effective mathematical tools for the solutions of partial differential equations that model physical processes;
- To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems;
- To acquaint the student with Fourier transform techniques used in wide variety of situations in which the functions used are not periodic;
- To develop Z-transform techniques which will perform the same task for discrete time systems as Laplace Transform, a valuable aid in analysis of continuous time systems.

UNIT I PARTIAL DIFFERENTIAL EQUATIONS 9+3
Formation – Solutions of first order equations – Standard types and Equations reducible to standard types – Singular solutions – Lagrange’s Linear equation – Integral surface passing through a given curve – Classification of Partial Differential Equations – Solution of linear equations of higher order with constant coefficients – Linear non-homogeneous PDE.

UNIT II FOURIER SERIES 9+3
Dirichlet’s conditions – General Fourier series – Odd and even functions – Half-range Sine and Cosine series – Complex form of Fourier series – Parseval’s identity – Harmonic Analysis.

UNIT III APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATION 9+3
Method of separation of Variables – Solutions of one dimensional wave equation and one-dimensional heat equation – Steady state solution of two-dimensional heat equation – Fourier series solutions in Cartesian coordinates.

UNIT IV FOURIER TRANSFORM 9+3

UNIT V Z-TRANSFORM AND DIFFERENCE EQUATIONS 9+3

TOTAL: 60 PERIODS

OUTCOMES:
- The understanding of the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.

TEXTBOOK:

REFERENCES:

CE 8301 CONSTRUCTION TECHNIQUES AND PRACTICES

OBJECTIVE:
- To make aware of the various techniques and practices on various stages of concreting, masonry works, service requirements, rehabilitation works and careful selection of suitable construction equipment.

UNIT I CONCRETE TECHNOLOGY 12

UNIT II CONSTRUCTION PRACTICES 10

UNIT III SERVICE REQUIREMENTS 8

UNIT IV REPAIR AND REHABILITATION WORKS 7
Causes of damage and deterioration in masonry and concrete structures – Symptoms and Diagnosis – Common types of repairs – Grouting – Case studies on Repair and / or Rehabilitation works of Buildings and Bridges.

UNIT V CONSTRUCTION EQUIPMENT 8
Selection of equipment for earthwork, concreting, material handling and erection of structures – Dewatering and pumping equipments.

TOTAL: 45 PERIODS

OUTCOMES:
- Students completing the course will have understanding of different construction techniques and practices. They will be able to plan the requirements for substructure and superstructure a construction.

TEXTBOOKS:
REFERENCES:

AG 8302  ENGINEERING GEOLOGY  L T P C  3 0 0 3

OBJECTIVES:
- At the end of this course the students will be able to understand the importance of geological knowledge such as earth, earthquake, volcanism and the action of various geological agencies. The students of civil engineering will realize the importance of this knowledge in projects such as dams, tunnels, bridges, roads, airport and harbor. The knowledge of geophysical methods and remote sensing techniques are useful to know the various surface and subsurface features. Based on this, civil engineers can choose the types of foundations and other related aspects.

UNIT I  PHYSICAL GEOLOGY  9

UNIT II  MINEROGEOLOGY  9

UNIT III  PETROLOGY  9
Classification of rocks, distinction between Igneous, Sedimentary and Metamorphic rocks. Engineering properties of rocks. Description, occurrence, engineering properties, distribution and uses of Granite, Dolerite, Basalt, Sandstone, Limestone, Laterite, Shale, Quartzite, Marble, Slate, Gneiss and Schist.

UNIT IV  STRUCTURAL GEOLOGY AND GEOPHYSICAL METHODS  9

UNIT V  GEOLOGICAL INVESTIGATION  9
Remote sensing for civil engineering applications; Geological conditions necessary for design and construction of Dams, Reservoirs, Tunnels, and Road cuttings. Coastal protection structures. Investigation of Landslides, causes and mitigation.

TOTAL: 45 PERIODS

OUTCOMES: The students completing this course
- Will be able to understand the importance of geological knowledge such as earth, earthquake, volcanism and the action of various geological agencies.
- Will realize the importance of this knowledge in projects such as dams, tunnels, bridges, roads, airport and harbor
- Can choose the types of foundations and other related aspects.
TEXTBOOKS:

REFERENCES:

CE 8302 STRENGTH OF MATERIALS – I L T P C
3 0 0 3

OBJECTIVES:
- To know the method of finding slope and deflection of beams and trusses using energy theorems and to know the concept of analyzing indeterminate beam
- To estimate the load carrying capacity of columns, stresses due to unsymmetrical bending and various theories for failure of material.

UNIT I STRESS, STRAIN AND DEFORMATION OF SOLIDS 10

UNIT II ANALYSIS OF PLANE TRUSSES 8
Stability and equilibrium of plane frames – Perfect frames - Types of trusses – Analysis of forces in truss members – Method of joints – Method of tension co-efficient – Method of sections.

UNIT III BENDING OF BEAMS 10

UNIT IV TORSION 8
Theory of simple torsion - Stresses and deformation in circular and hollow shafts – Stepped shafts – Shafts fixed at both ends – Stresses and deflection in helical springs.

UNIT V DEFLECTION OF BEAMS 9
Double Integration method – Macaulay’s method – Area moment method – Conjugate beam method for computation of slopes and deflections in determinate beams.

TOTAL: 45 PERIODS
OUTCOMES:
- students will have through knowledge in analysis of indeterminate beams and use of energy method for estimating the slope and deflections of beams and trusses.
- they will be in a position to assess the behavior of columns, beams and failure of materials

TEXTBOOKS:

REFERENCES:
1. Irwing H.Shames, James M.Pitarresi, Introduction to Solid Mechanics, Prentice Hall of India, New Delhi, 2002

CE 8351 FLUID MECHANICS L T P C
3 1 0 4

OBJECTIVE:
- To introduce the students to the mechanics of fluids through a thorough understanding of the properties of the fluids, behaviour of fluids under static conditions. The dynamics of fluids is introduced through the control volume approach which gives an integrated understanding of the transport of mass, momentum and energy.
- To expose to the applications of the conservation laws to a) flow measurements b) flow through pipes (both laminar and turbulent) and c) forces on vanes.

UNIT I FLUIDS PROPERTIES AND FLUID STATICS 12
Scope of fluid mechanics - Definitions of a fluid - Methods of analysis - Dimensions and units - viscosity, density, perfect gas, vapour pressure and surface tension - Basic equation of fluid statics - Pressure measurements - Manometers. - Forces on plane and curved surfaces - Buoyancy and floatation - Stability of floating bodies - Relative equilibrium.

UNIT II BASIC CONCEPTS OF FLUID FLOW 12
(a) Kinematics – Methods of describing fluid motion - Classification of flows - Streamline, streak-line and path-lines - Stream function and velocity potentials - Flow nets; (b) Dynamics - Dimensional Concepts of System and Control volume - Application of control volume to continuity, energy and momentum - Euler’s equation of motion along a stream line - Bernoulli’s equation - Applications to velocity and discharge measurements - Linear momentum equation and moment-of-momentum equations and their applications.

UNIT III DIMENSIONAL ANALYSIS AND MODEL STUDIES 12
Fundamental dimensions - dimensional homogeneity - Rayleigh’s method and Buckingham Pi-Theorem - Dimensionless parameters - Similitude and model studies - Distorted Models.

UNIT IV INCOMPRESSIBLE VISCOUS FLOW 12
Laminar flow between parallel plates, and pipes - Development of laminar and turbulent flows
in pipes - Reynolds experiment - Darcy-Weisbach equation - Moody diagram - Major and minor losses of flow in pipes - Pipes in series and in parallel.

UNIT V BOUNDARY LAYERS AND TRANSPORT BY ADVECTION AND DIFFUSION

Definition of boundary layers - Displacement, momentum and energy thickness - Laminar and turbulent boundary layers - Momentum integral equation – Steady molecular diffusion and conduction – Turbulent transport equations – Channel diffusion and Dispersions and Applications.

OUTCOMES:
- The students will be able to get a basic knowledge of fluids in static, kinematic and dynamic equilibrium.
- They will also gain the knowledge of the applicability of physical laws in addressing problems in hydraulics.

TEXTBOOKS:

REFERENCES:

CE 8311 COMPUTER AIDED BUILDING DRAWING

OBJECTIVES:
- To introduce the students to draft the plan, elevation and sectional views of buildings in accordance with development and control rules satisfying orientation and functional requirements as per National Building Code.

LIST OF EXPERIMENTS
1. Principles of planning, orientation and complete joinery details (Paneled and Glazed Doors and Windows)
2. Buildings with load bearing walls
3. Buildings with sloping roof
4. R.C.C. framed structures.
5. Industrial buildings – North light roof structures
6. Building Information Modeling

OUTCOMES:
- The students will be able to draft the plan, elevation and sectional views of the buildings, industrial structures, framed buildings using computer softwares.
TEXTBOOKS:

REFERENCES:
4. Chuck Eastman, Paul Teicholz, Rafael Sacks, Kathleen Liston, BIM Handbook:

CE 8362  
STRENGTH OF MATERIALS LABORATORY  
L T P C  
0 0 3 2

OBJECTIVES:
- To expose the students to the testing of different materials under the action of various forces and determination of their characteristics experimentally.

LIST OF EXPERIMENTS
1. Tension test on mild steel rod
2. Compression test on wood
3. Double shear test on metal
4. Torsion test on mild steel rod
5. Impact test on metal specimen (Izod and Charpy)
6. Hardness test on metals (Rockwell and Brinell Hardness Tests)
7. Deflection test on metal beam
8. Compression test on helical spring
9. Deflection test on carriage spring

TOTAL: 30 PERIODS

OUTCOMES:
- The students will have the required knowledge in the area of testing of materials and components of structural elements experimentally.

REFERENCES:
2. IS 1786-2008 – Specification for cold worked steel high strength deformed bars for concrete reinforcement

MA 8353  
NUMERICAL METHODS  
L T P C  
3 1 0 4

OBJECTIVES:
- To provide the mathematical foundations of numerical techniques for solving linear system, eigenvalue problems, interpolation, numerical differentiation and integration and the errors associated with them;
- To demonstrate the utility of numerical techniques of ordinary and partial
differential equations in solving engineering problems where analytical solutions are not readily available.

UNIT I  
SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS  
9+3

UNIT II  
INTERPOLATION AND APPROXIMATION  
9+3
Interpolation with unequal intervals - Lagrange interpolation – Newton’s divided difference interpolation – Cubic Splines - Interpolation with equal intervals - Newton’s forward and backward difference formulae – Least square method - Linear curve fitting.

UNIT III  
NUMERICAL DIFFERENTIATION AND INTEGRATION  
9+3

UNIT IV  
INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS  
9+3

UNIT V  
BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS  
9+3
Finite difference methods for solving two-point linear boundary value problems. Finite difference techniques for the solution of two dimensional Laplace’s and Poisson’s equations on rectangular domain - One dimensional heat-flow equation by explicit and implicit (Crank-Nicholson) methods - One dimensional wave equation by explicit method.

TOTAL: 60 PERIODS

OUTCOMES:
- The students will have a clear perception of the power of numerical techniques, ideas and would be able to demonstrate the applications of these techniques to problems drawn from industry, management and other engineering fields.

TEXTBOOKS :

REFERENCES:
OBJECTIVES:
- To study the nature and facts about environment.
- To finding and implementing scientific, technological, economic and political solutions to environmental problems.
- To study the interrelationship between living organism and environment.
- To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.
- To study the dynamic processes and understand the features of the earth’s interior and surface.
- To study the integrated themes and biodiversity, natural resources, pollution control and waste management.

UNIT I  ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY  14
Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.
Field study of common plants, insects, birds
Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT II  ENVIRONMENTAL POLLUTION  8
Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – soil waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides.
Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT III  NATURAL RESOURCES  10
Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles.
Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.
UNIT IV  SOCIAL ISSUES AND THE ENVIRONMENT  7

UNIT V  HUMAN POPULATION AND THE ENVIRONMENT  6

OUTCOMES:
- Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course.
- Public awareness of environmental is at infant stage.
- Ignorance and incomplete knowledge has lead to misconceptions
- Development and improvement in std. of living has lead to serious environmental disasters

TEXTBOOKS :

REFERENCES :

CE 8401  APPLIED HYDRAULIC ENGINEERING  L T P C
3 1 0 4

OBJECTIVES:
- To introduce the students to various hydraulic engineering problems like open channel flows and hydraulic machines. At the completion of the course, the student should be able to relate the theory and practice of problems in hydraulic engineering.

UNIT I  UNIFORM FLOW  9 + 3
Definition and differences between pipe flow and open channel flow - Types of Flow - Properties of open channel - Fundamental equations - Velocity distribution in open channel - Steady
uniform flow: Chezy equation, Manning equation - Best hydraulic sections for uniform flow - Computation in Uniform Flow - Specific energy and specific force.

UNIT II VARIED FLOWS 9 + 3

UNIT III RAPIDLY VARIED FLOWS 9 + 3
Application of the energy equation for RVF - Critical depth and velocity - Critical, Sub-critical and Super-critical flow - Application of the momentum equation for RVF - Hydraulic jumps - Types - Energy dissipation - Surges and surge through channel transitions.

UNIT IV TURBINES 9 + 3
Turbines - Classification - Reaction turbines - Francis turbine, Radial flow turbines, draft tube and cavitation - Propeller and Kaplan turbines - Impulse turbine - Performance of turbine - Specific speed - Runaway speed - Similarity laws.

UNIT V PUMPS 9 + 3
Centrifugal pumps - Minimum speed to start the pump - NPSH - Cavitations in pumps - Operating characteristics - Multistage pumps - Reciprocating pumps - Negative slip - Flow separation conditions - Air vessels, indicator diagrams and its variations - Savings in work done - Rotary pumps: Gear pump.

OUTCOMES:
- The students will be able to apply their knowledge of fluid mechanics in addressing problems in open channels.
- They will possess the skills to solve problems in uniform, gradually and rapidly varied flows in steady state conditions.
- They will have knowledge in hydraulic machineries (pumps and turbines).

TEXTBOOKS:

REFERENCES:

CE 8402 SOIL MECHANICS L T P C 3 0 0 3

OBJECTIVES:
- To impart knowledge on behavior and the performance of saturated soil. At the end of this course student attains adequate knowledge in assessing both Physical and Engineering behaviour of soils, mechanism of stress transfer in two-phase systems and stability analysis of slopes.
UNIT I  SOIL CLASSIFICATION AND COMPACTION  

UNIT II  SOIL WATER AND WATER FLOW  

UNIT III  STRESS DISTRIBUTION AND SETTLEMENT  

UNIT IV  SHEAR STRENGTH  

UNIT V  SLOPE STABILITY  

OUTCOMES:  
• Students have the ability to determine Index properties and classify the soil. They can also know to determine engineering properties through standard tests and empirical correction with index properties.

TEXTBOOKS:  

REFERENCES:  
OBJECTIVE:
- To learn the computation of deflection of beams and trusses using energy principles, analysis of indeterminate beams and columns, state of stress in three dimensions.

UNIT I ENERGY PRINCIPLES
9
Strain energy and strain energy density – Strain energy in axial force - Shear, flexure and torsion – Castigliano’s and Engesser’s theorems – Principle of virtual work – Application of energy theorems for computing deflections in beams – Maxwell’s reciprocal theorem.

UNIT II INDETERMINATE BEAMS
9
Propped Cantilever and Fixed Beams – Fixed end moments reactions, slope and deflection for standard cases of loading — Continuous beams – support reactions and moments – Theorem of three moments – Shear Force and Bending Moment Diagrams.

UNIT III COLUMNS
9
Behaviour of short and long columns. Euler’s theory of long columns – Critical loads for prismatic columns with different end conditions - Rankine-Gordon Formula - Eccentrically loaded long columns -Eccentrically loaded short columns - middle third rule – Core of section.

UNIT IV STATE OF STRESS IN THREE DIMENSIONS
9
Determination of principal stresses and principal planes – Volumetric strain – Theories of failure – Principal stress, principal strain, shear stress, strain energy and distortion energy theories – Application in analysis of stress, load carrying capacity and design of members. Interaction problems - Interaction curves.

UNIT V ADVANCED TOPICS
9

TOTAL: 45 PERIODS

OUTCOMES:
- students will have through knowledge in analysis of indeterminate beams and use of energy method for estimating the slope and deflections of beams and trusses.
- they will be in a position to assess the behaviour of columns, beams and failure of materials.

TEXTBOOKS:

REFERENCES:
OBJECTIVE:
- To introduce the principle of surveying various methods and applications to Civil Engineering projects

UNIT I  FUNDAMENTALS AND CHAIN SURVEYING  9
Definition- Classifications - Basic principles-Equipment and accessories for ranging and chaining – Methods of ranging - well conditioned triangles – Errors in linear measurement and their corrections - Obstacles - Traversing – Plotting – applications - enlarging the reducing the figures – Areas enclosed by straight line irregular figures- digital planimetre.

UNIT II  COMPASS AND PLANE TABLE SURVEYING  9

UNIT III  LEVELLING  9

UNIT IV  LEVELLING APPLICATIONS  9

UNIT V  THEODOLITE SURVEYING  9
Theodolite - Types - Description - Horizontal and vertical angles - Temporary and permanent adjustments – Heights and distances– Tangential and Stadia Tacheometry – Subtense method - Stadia constants - Anallactic lens.

TOTAL: 45 PERIODS

OUTCOMES:
- Students are expected to use all surveying equipments, prepare LS & CS, contour maps and carryout surveying works related to land and civil engineering projects.

TEXTBOOKS:

REFERENCES:
OBJECTIVE:
- Students should be able to verify the principles studied in theory by performing the experiments in lab.

LIST OF EXPERIMENTS
A. Flow Measurement
   1. Calibration of Rotometer
   2. Flow through Venturimeter
   3. Flow through variable duct area - Bernoulli’s Experiment
B. Losses in Pipes
   4. Determination of friction coefficient in pipes
   5. Determination of loss coefficients for pipe fittings
C. Pumps
   6. Characteristics of Centrifugal pumps
   7. Characteristics of Gear pump
   8. Characteristics of Submersible pump
   9. Characteristics of Reciprocating pump
D. Turbines
   10. Characteristics of Pelton wheel turbine
    11. Characteristics of Francis turbine
E. Determination of Metacentric height
    12. Determination of Metacentric height

TOTAL: 45 PERIODS

OUTCOMES:
- The students will be able to measure flow in pipes and determine frictional losses.
- The students will be able to develop characteristics of pumps and turbines.

REFERENCES:

OBJECTIVE:
- To familiarize with the various surveying instruments and methods.

I CHAIN SURVEYING
   a) Chain traversing

II COMPASS SURVEYING
   a) Compass traversing

III PLANE TABLE SURVEYING
   a) Compass traversing
a) Radiation and Intersection: Resection - Three point problem
b) Mechanical and Graphical solution c) Trial and error method
d) Resection - Two Point problem e) Plane table traversing

IV LEVELLING
a) Fly levelling using Dumpy level b) Fly levelling using Tilting level c) Check levelling
d) Contouring e) LS and CS

V THEODOLITE SURVEYING
Measurement of horizontal angles and vertical angles
Heights and Distances by
a) Triangulation problem b) Single plane method
c) Stadia and Tangential method

TOTAL: 60 PERIODS

OUTCOMES:
- Students completing this course would have acquired practical knowledge on handling basic survey instruments including leveling and development of contour map of given area.

REFERENCES:

CE 8501 DESIGN OF REINFORCED CEMENT CONCRETE AND MASONRY STRUCTURES

OBJECTIVE:
- To introduce the various philosophies of R.C. design and to study in detail the limit state design of structural elements such as beams, columns and footings

UNIT I DESIGN CONCEPTS AND ELASTIC DESIGN OF BEAMS
10

UNIT II LIMIT STATE DESIGN OF BEAMS
10
Design of singly and doubly reinforced rectangular and flanged beams – use of design aids for flexure – Behaviour of R.C. beams in shear and torsion – Shear and torsional reinforcement – Limit State design of R.C. members for combined bending, shear and torsion – Use of design aids. Design requirement for bond and anchorage as per IS code. Serviceability requirements.

UNIT III LIMIT STATE DESIGN OF SLABS
10
Behaviour of one way and two way slabs — design of one way simply supported, cantilever and continuous slabs. Design of two-way slabs for various edge conditions. Types of staircases - design of dog-legged staircase.

UNIT IV LIMIT STATE DESIGN OF COLUMNS AND FOOTING
10
Types of columns – design of short columns for axial load, combined axial load with uniaxial and biaxial bending - use of design aids. Design of footing for masonry and reinforced walls – design of axially and eccentrically loaded square and rectangular footings – design of combined rectangular footings for two columns only.
UNIT V  MASONRY MEMBERS  5
Determination of permissible stresses on masonry, load carrying capacity of masonry walls and pillars - Design of masonry walls, pillars and footings as per IS Codes.
TOTAL: 45 PERIODS

OUTCOMES:
- The student shall be in a position to design the basic elements of reinforced concrete structures.

TEXTBOOKS:

REFERENCES:

CE 8502  FOUNDATION ENGINEERING  L T P C  3 0 0 3

OBJECTIVE:
- To impart knowledge on common method of sub soil investigation and design of foundation. At the end of this course student acquires the capacity to investigate the soil condition and to select and design a suitable foundation.

UNIT I  SITE INVESTIGATION AND SELECTION OF FOUNDATION  9

UNIT II  SHALLOW FOUNDATION  9
UNIT III  FOOTINGS AND RAFTS
Types of footings – Contact pressure distribution: Isolated footing – Combined footings – Types and proportioning – Mat foundation – Types and applications – Proportioning – Floating foundation – Seismic force consideration – Codal Provision.

UNIT IV  PILE FOUNDATION
Types of piles and their function – Factors influencing the selection of pile – Carrying capacity of single pile in granular and cohesive soil – static formula – dynamic formulae (Engineering news and Hileys) – Capacity from insitu tests (SPT and SCPT) – Negative skin friction – uplift capacity- Group capacity by different methods (Feld’s rule, Converse – Labarra formula and block failure criterion) – Settlement of pile groups – Interpretation of pile load test (routine test only) – Under reamed piles – Capacity under compression and uplift.

UNIT V  RETAINING WALLS

TOTAL : 45 PERIODS

OUTCOMES:
• Students will have the ability to select type of foundation required for the soil at a place and able to design shallow, foundation, deep foundation and retaining structures.

TEXTBOOKS:

REFERENCES:
OBJECTIVE:
- To give an overview / basis of highway engineering with respect to the development, planning, design, construction and maintenance of highways.

UNIT I HIGHWAY PLANNING AND ALIGNMENT  8
History of road development in India – Classification of highways – Institutions for Highway planning, design and construction at different levels – factors influencing highway alignment – Road ecology - Engineering surveys for alignment, objectives, conventional and modern methods.

UNIT II GEOMETRIC DESIGN OF HIGHWAYS  10
Typical cross sections of Urban and Rural roads — Cross sectional elements – Horizontal curves, super elevation, transition curves, widening of curves – Sight distances – Vertical curves, gradients, hairpin bends – Lateral and vertical clearance at underpasses - IRC standards

UNIT III DESIGN OF FLEXIBLE AND RIGID PAVEMENTS  9
Design principles – pavement components and their role - Design practice for flexible and rigid pavements (IRC methods only).

UNIT IV HIGHWAY CONSTRUCTION MATERIALS AND PRACTICE  8
Highway construction materials, properties, testing methods – Construction practice including modern materials and methods, Concrete road constructions, Polymer modified bitumen, Recycling, Different materials – Glass, Fibre, Plastic, Geo-Textiles, Geo-Membrane (problem not included) - Highway drainage – Special considerations for hilly roads.

UNIT V EVALUATION AND MAINTENANCE OF PAVEMENTS  10

TOTAL: 45 PERIODS

OUTCOMES:
- The students completing this course would have acquired knowledge on planning, design, construction and maintenance of highways as per IRC standards and other methods.

TEXTBOOKS:
1. Subramanian K.P., Highways, Railways, Airport and Harbour Engineering, Scitech Publications (India), Chennai, 2010
3. Indian Road Congress (IRC), Guidelines and Special Publications of Planning and Design.

REFERENCES:

CE 8504 STRUCTURAL ANALYSIS – I

OBJECTIVES:
- To introduce the students to basic theory and concepts of structural analysis and the classical methods for the analysis of buildings.

UNIT I DEFORMATION OF DETERMINATE STRUCTURES
Principles of virtual work for deflections - Deflections of pin-jointed plane frames and rigid plane frames – Williott's diagram.

UNIT II SLOPE DEFLECTION METHOD
Slope deflection equations - Analysis of continuous beams and rigid frames - Support settlements.

UNIT III MOMENT DISTRIBUTION METHOD
Stiffness and carry over factors – Distribution and carry over of moments - Analysis of continuous Beams - Plane rigid frames with and without sway – Support settlement.

UNIT IV FLEXIBILITY MATRIX METHOD
Equilibrium and compatibility - Determinate vs. indeterminate structures - Static and Kinematic Indeterminacy - primary structure - Compatibility conditions - Analysis of indeterminate pin-jointed plane frames, continuous beams, rigid jointed plane frames.

UNIT V MATRIX STIFFNESS METHOD

OUTCOMES: Students will be able to
- analysis trusses, frames and arches
- analyse structures for moving loads and
- will be conversant with classical methods of analysis.

TEXTBOOKS:
REFERENCES:
1. William Weaver, Jr & James M.Gere, Matrix analysis of framed structures, CBS Publishers & Distributors, Delhi, 1995

CE 8505 SURVEYING - II

OBJECTIVE:
• This subject deals with geodetic measurements and Control Survey methodology and its adjustments. The student is also exposed to the Modern Surveying.

UNIT I CONTROL SURVEYING

UNIT II SURVEY ADJUSTMENT

UNIT III TOTAL STATION SURVEYING

UNIT IV GPS SURVEYING
Basic Concepts - Different segments - space, control and user segments - satellite configuration - signal structure - Orbit determination and representation - Anti Spoofing and Selective Availability - Task of control segment – Hand Held and Geodetic receivers –data processing - Traversing and triangulation.

UNIT V MISCELLANY

TOTAL: 45 PERIODS
OUTCOMES: On completion of this course students shall be able to
- Understand the advantages of electronic surveying over conventional surveying methods
- Understand the working principle of GPS, its components, signal structure, and error sources
- Understand various GPS surveying methods and processing techniques used in GPS observations

TEXTBOOKS:

CE 8506 WATER SUPPLY ENGINEERING L T P C 3 0 0 3

OBJECTIVE:
- To equip the students with the principles and design of water treatment and distribution.

UNIT I SOURCES OF WATER 9

UNIT II CONVEYANCE FROM THE SOURCE 9

UNIT III WATER TREATMENT 10
Objectives – Unit operations and processes – Principles, functions, and design of water treatment plant units, aerators of flash mixers, flocculators, sedimentation tanks and sand filters; Disinfection – Iron and Manganese removal, Defluoridation – Residue Management – Corrosion Control; Construction, Operation and Maintenance aspects – Process flow diagram Layout and Hydraulic Profile for water treatment plants.

UNIT IV ADVANCED WATER TREATMENT 7

UNIT V WATER DISTRIBUTION AND SUPPLY TO BUILDINGS 10

TOTAL: 45 PERIODS
OUTCOMES: The students completing the course will have
- an insight into the structure of drinking water supply systems, including water transport, treatment and distribution
- an understanding of water quality criteria and standards, and their relation to public health,
- the ability to design and evaluate water supply project alternatives on basis of chosen selection criteria

TEXTBOOKS:

REFERENCES:

CE 8511 HIGHWAY ENGINEERING LABORATORY L T P C 0 0 4 2

OBJECTIVE:
To learn the principles and procedures of testing of highway materials

EXERCISES:
I TEST ON AGGREGATES
a) Specific Gravity
b) Sieve Analysis
c) Flakiness and Elongation Test d) Aggregate Impact Test
e) Los Angeles Abrasion Test
f) Water Absorption of Aggregates

II TEST ON BITUMEN
a) Specific Gravity of Bitumen
b) Penetration Test c) Viscosity Test
d) Softening Point Test e) Ductility Test

III TESTS ON BITUMINOUS MIXES
a) Stripping Test
b) Determination of Binder Content
c) Marshall Stability and Flow Values

IV DEMONSTRATION OF FIELD TESTING EQUIPMENT TOTAL: 60 PERIODS

OUTCOMES:
- Student knows the techniques to characterize various pavement materials through relevant tests.

REFERENCES:
OBJECTIVE:
- At the end of the course student attains adequate knowledge in assessing both Physical and Engineering behaviour of soils through laboratory testing procedures.

EXERCISES:
1. **DETERMINATION OF INDEX PROPERTIES**
   a. Special gravity of soil solids
   b. Grain size distribution – Sieve analysis
   c. Grain size distribution Hydrometer analysis
d. Liquid limit and Plastic limit tests
   e. Shrinkage limit and Differential free swell tests

2. **DETERMINATION OF INSITU DENSITY AND COMPACCTION CHARACTERISTICS**
   a. Field density Test (Sand replacement method)

3. **DETERMINATION OF ENGINEERING PROPERTIES**
   a. Permeability determination (constant head and falling head methods)
   b. One dimensional consolidation test (Determination of co-efficient of consolidation only)
   c. Direct shear test in cohesion-less soil
   d. Unconfined compression test in cohesive soil
   e. Laboratory vane Shear test in cohesive soil
   f. Tri-axial compression test in cohesion-less soil (Demonstration only)
   g. California Bearing Ratio Test

4. **TEST ON GEOSYNTHETICS (Demonstration only)**
   a. Determination of tensile strength and interfacing friction angle.
   b. Determination of apparent opening sizes and permeability.

TOTAL: 60 PERIODS

OUTCOMES:
- Students know the techniques to determine index properties and engineering properties such as shear strength, compressibility and permeability by conducting appropriate tests.

REFERENCES:
5. IS Code of Practice (2720) Relevant Parts, as amended from time to time, Bureau of Indian Standards, New Delhi.
OBJECTIVE:

- The objective of this course is to train the students to acquire skills in making precise measurements and obtaining accurate results.

EXERCISES:

I. a. TOTAL STATION SURVEYING  8
   b. Study of Micro –Optic , Digital Theodolite and Total Station
      Total station Traversing

II. a. GPS SURVEYING  16
    b. c. Study of Hand Held GPS Study of geodetic GPS Precise
        d. Positioning
        GPS Traversing

III. FIELD ASTRONOMY  20
    a. b. Study of motion of the Sun
    c. d. Determination of azimuth using known latitude Determination
        e. of azimuth using hour angle Determination of watch error
           Determination of latitude

IV. SETTING OUT WORKS  8
    a. b. Simple curve using chain and tape only
        Simple curve by Rankine’s method

V. ESTABLISHMENT OF BASELINE  4

VI. THEODOLITE TRAVERSING  4
    TOTAL: 60 PERIODS

OUTCOMES:

- Students completing this course would have acquired practical knowledge on handling survey instruments like Theodolite, Tacheometry GPS and Total station and have adequate knowledge to carryout Triangulation and Astronomical surveying including general field marking for various engineering projects and curves setting.

REFERENCE:


CE 8601 DESIGN OF STEEL AND TIMBER STRUCTURES  L T P C  3 0 0 3

OBJECTIVE:

- To learn the design of Component and structure using steel (Limit State Design) and timber material subjected to external loading.

UNIT I  SECTIONS AND JOINTS  12

UNIT II  TENSION MEMBERS  8
Design of simple and built-up members subjected to tension – Effective area of angles connected to gussets.
UNIT III  COMPRESSION MEMBERS  8
Maximum slenderness ratio of various compression members – IS code provision for compression members – Design of simple and built-up compression members with lacings and battens – Design of column bases.

UNIT IV  BEAMS  11
Design of simple beams based on strength and stiffness as per IS code – Design of built-up beams and curtailment of flange plates - Flange splice and web splice- Design of plate girder and stiffeners.

UNIT V  TIMBER  6
Study of properties and strength of natural and laminated timber – Allowable stresses in compression, tension and flexure as per IS Code – Types of joints with nails and bolts – Design of simple compression members as per IS code– Design of beams for strength and stiffness as per IS code.

TOTAL: 45 PERIODS

OUTCOMES:
- The students would have knowledge on the design of structural steel members subjected to compressive, tensile and bending forces, as per current code and also know to design Timber Members.

TEXTBOOKS:

REFERENCES:

CE 8602  RAILWAYS, AIRPORTS AND HARBOUR ENGINEERING  L T P C
3 0 0 3

OBJECTIVE:
- To introduce the students about Railways planning, design, construction and maintenance and planning design principles of airport and harbour

UNIT I  RAILWAY PLANNING AND CONSTRUCTION  10
Elements of permanent way – Rails, Sleepers, Ballast, rail fixtures and fastenings, Selection of gauges - Track Stress, coning of wheels, creep in rails, defects in rails – Route alignment surveys, conventional and modern methods--Geometric design of railway, gradient, super elevation, widening of guage on curves- Level Crossings.

UNIT II  RAILWAY CONSTRUCTION AND MAINTENANCE  8
Earthwork – Stabilization of track on poor soil - Tunneling Methods, drainage and ventilation – Calculation of Materials required for track laying - Construction and maintenance of tracks –Railway Station and yards and passenger amenities
UNIT III  AIRPORT PLANNING
Air transport characteristics-air port classification-air port planning: objectives, components, layout characteristics, socio-economic characteristics of the Catchment area, criteria for airport site selection and ICAO stipulations, typical Airport Layouts, Case Studies, parking and Circulation Area.

UNIT IV  AIRPORT DESIGN

UNIT V  HARBOUR ENGINEERING

OUTCOMES:
- On completing the course, the students will have the ability to Plan and Design various civil Engineering aspects of Railways, Airports and Harbour.

TEXTBOOKS:
1. Subramanian K.P., Highways, Railways, Airport and Harbour Engineering, Scitech Publications (India), Chennai, 2010
2. Saxena Subhash, C. and Satyapal Arora, A Course in Railway Engineering, Dhanapat Rai and Sons, Delhi, 1998

REFERENCES:
2. Shahini P., Airport Technique, New Delhi
3. Priyani V.B., Highway and Airport Engineering, Charotar Book Stall, 1994
6. Agarwal M.M., Indian Railway Track, New Delhi

CE 8603  STRUCTURAL ANALYSIS – II

OBJECTIVE:
- To learn the influence lines and its uses in various applications like bridges, arches.
- Also to learn Plastic analysis of beams and rigid frames.

UNIT I  MOVING LOADS AND INFLUENCE LINES
Influence lines for reactions in statically determinate structures – Influence lines for shear force and bending moment in beam sections – Calculation of critical stress resultants due to concentrated and distributed moving loads - influence lines for member forces in pin jointed frames.
UNIT II  INFLUENCE LINES FOR INDETERMINATE STRUCTURES
Muller Breslau's principle – Application of Muller Breslau's principle to determinate beams and continuous beams.

UNIT III  ARCHES
Arches - Structural forms – Examples of arch structures – Types of arches – Analysis of three hinged, two hinged and fixed arches - Parabolic and circular arches – Settlement and temperature effects

UNIT IV  SUSPENSION BRIDGES AND SPACE TRUSSES
Analysis of suspension bridges – Unstiffened cables and cables with three hinged stiffening girders – Influence lines for three hinged stiffening girders - Introduction to analysis of space trusses using method of tension coefficients – Beams curved in plan.

UNIT V  PLASTIC ANALYSIS

TOTAL: 45 PERIODS

OUTCOMES:
• The student will have the knowledge on advanced methods of analysis of structures including space and cable structures.

TEXTBOOKS:

REFERENCES:

CE 8604  STRUCTURAL DESIGN AND DRAWING  L T P C
2 0 3 4

OBJECTIVES:
• This course aims at providing students with a solid background on the principles of structural engineering design. Students will be exposed to the theories and concepts of both concrete and steel design and analysis both at the element and system levels.

UNIT I  INTRODUCTION AND PLANNING
UNIT II  LIQUID STORAGE STRUCTURES  
RC Water Tanks - Circular and Rectangular – Design and Drawing – Hemispherical Bottomed Steel Water Tank – Design and Drawing.

UNIT III  DESIGN OF BRIDGE COMPONENTS  
IRC Specifications and Loading – Design and Drawing of a Solid Slab RC Bridge – Design and Drawing of Steel Foot-over Bridge.

UNIT IV  RETAINING WALLS  
Design and Detailing of RC Cantilever and Counterfort Retaining Walls – Horizontal Backfill with Surcharge – Design of Shear Key.

UNIT V  INDUSTRIAL STRUCTURES  

TOTAL : 75 PERIODS

OUT COMES:
- At the end of the course the student acquires hands on experience in design and preparation of structural drawings for concrete / steel structures normally encountered in Civil Engineering practice.

TEXTBOOKS:

REFERENCES:

OBJECTIVE:
- The objectives of this course is to help students develop the ability to apply basic understanding of physical, chemical, and biological phenomena for successful design, operation and maintenance of sewage treatment plants.

UNIT I  PLANNING AND DESIGN OF SEWERAGE SYSTEM  

UNIT II  PRIMARY TREATMENT OF SEWAGE  
UNIT III SECONDARY TREATMENT OF SEWAGE

UNIT IV DISPOSAL OF SEWAGE

UNIT V SLUDGE TREATMENT AND DISPOSAL

TOTAL: 45 PERIODS

OUTCOMES: The students completing the course will have
- ability to estimate sewage generation and design sewer system including sewage pumping stations
- required understanding on the characteristics and composition of sewage, self-purification of streams
- ability to perform basic design of the unit operations and processes that are used in sewage treatment

TEXTBOOKS:

REFERENCES:

HS 8561 EMPLOYABILITY SKILLS
(Lab / Practical Course)
(Common to all branches of Fifth or Sixth Semester B.E / B.Tech programmes)

OBJECTIVES
- To enhance the employability skills of students with a special focus on Presentation skills, Group discussion skills and Interview skills
- To help them improve their soft skills, including report writing, necessary for the workplace situations
2. Creating effective PPTs – presenting the visuals effectively
3. Using body language with awareness – gestures, facial expressions, etc.
4. Preparing job applications - writing covering letter and résumé
5. Applying for jobs online - email etiquette
6. Participating in group discussions – understanding group dynamics - brainstorming the topic
7. Training in soft skills - persuasive skills – sociability skills - questioning and clarifying skills – mock GD
8. Writing reports – collecting, analyzing and interpreting data – drafting the report
9. Attending job interviews – answering questions confidently
10. Interview etiquette – dress code – body language – mock interview

TOTAL 30: PERIODS

Requirements for a class of 30 students
1. A PC or a lap top with one or two speakers
2. A Collar mike and a speaker
3. An LCD projector and a screen
4. CD's and DVD's on relevant topics
5. Individual chairs for conducting group discussions

OUTCOMES: At the end of the course, learners should be able to
• Take international examination such as IELTS and TOEFL
• Make presentations and Participate in Group Discussions.
• Successfully answer questions in interviews.

REFERENCES:

EXTENSIVE READERS

WEB RESOURCES
1. www.humanresources.about.com
2. www.careerride.com

CE 8611 SURVEY CAMP
(2 weeks - during V semester - winter)

Two weeks Survey Camp will be conducted during winter vacation to expose on filed surveying such as Triangulation, Vertical control by spirit leveling and Contouring.
OBJECTIVES:
- This subject includes the list of experiments to be conducted for characterization of water and municipal sewage. At the end of the course, the student is expected to be aware of the procedure for quantifying quality parameters for water and sewage.

LIST OF EXPERIMENTS:
1. Sampling and preservation methods and significance of characterization of water and wastewater.
2. Determination of
   i) pH and turbidity
   ii) Hardness
3. Determination of iron and fluoride
4. Determination of residual chlorine
5. Determination of Chlorides
6. Determination of Ammonia Nitrogen
7. Determination of Sulphate
8. Determination of Optimum Coagulant Dosage
9. Determination of available Chlorine in Bleaching powder
10. Determination of dissolved oxygen
11. Determination of suspended, volatile and fixed
12. B.O.D. test
13. C.O.D. test
14. Introduction to Bacteriological Analysis (Demonstration only)
15. Estimation of Chemical Composition and reaction of cement as a part of the construction materials Laboratory.

TOTAL: 45 PERIODS

OUTCOMES:
- The students completing the course will be able to characterize wastewater and conduct treatability studies.

REFERENCES:

AIM:
- To learn the different principles and techniques of management in planning, organizing, directing and controlling.

OBJECTIVES:
- To study the Evolution of Management
- To study the functions and principles of management
- To learn the application of the principles in an organization
UNIT I  INTRODUCTION TO MANAGEMENT AND ORGANIZATIONS  

UNIT II  PLANNING  

UNIT III  ORGANISING  

UNIT IV  DIRECTING  

UNIT V  CONTROLLING  
System and process of controlling – budgetary and non-budgetary control techniques – use of computers and IT in Management control – Productivity problems and management – control and performance – direct and preventive control – reporting.

TOTAL: 45 PERIODS

OUTCOMES:
- Upon completion of the course, students will be able to have clear understanding of managerial functions like planning, organizing, staffing, leading & controlling and have same basic knowledge on international aspect of management

TEXTBOOKS:

REFERENCES:
OBJECTIVE:
- To offer knowledge in estimation, tender practices, contract procedures, and valuation. The student will be able to prepare estimates, call for tenders and execute works.

UNIT I  QUANTITY ESTIMATION  9

UNIT II  RATE ANALYSIS AND COSTING  9
Standard Data – Observed Data – Schedule of rates – Market rates – Assessment of Man Hours and Machineries for common civil works – Rate Analysis – Cost Estimates using Computer softwares

UNIT III  SPECIFICATIONS AND TENDERS  9

UNIT IV  CONTRACTS  9

UNIT V  VALUATION  9

TOTAL: L = 45 PERIODS

OUTCOMES:
- Upon completion of the course, students will be able to have clear understanding of managerial functions like planning, organizing, staffing, leading & controlling and have same basic knowledge on international aspect of management

TEXTBOOKS:

REFERENCES:
2. Tamil Nadu Transparencies in Tenders Act, 1998
3. Arbitration and Conciliation Act, 1996
OBJECTIVE:
- At the end of the course student is expected to identify the problematic soil and suitable suggest remedial measures to improve their behaviour.

UNIT I PROBLEMATIC SOIL AND IMPROVEMENT TECHNIQUES 8
Role of ground improvement in foundation engineering – methods of ground improvement – Geotechnical problems in alluvial, lateritic and black cotton soils – Selection of suitable ground improvement techniques based on soil conditions.

UNIT II DEWATERING 10
Dewatering Techniques - Well points – Vacuum and electroosmotic methods – Seepage analysis for two – dimensional flow for fully and partially penetrated slots in homogeneous deposits - Simple cases - Design.

UNIT III INSITU TREATMENT OF COHESIONLESS AND COHESIVE SOILS 10

UNIT IV EARTH REINFORCEMENT 9
Concept of reinforcement – Types of reinforcement material – Reinforced earth wall – Mechanism – simple design - applications of reinforced earth. Role of Geotextiles in filtration, drainage, separation, road works and containment.

UNIT V GROUT TECHNIQUES 8

TOTAL: 45 PERIODS

OUTCOMES:
- Student will be in a position to identify and evaluate the deficiencies if any in the deposits of a project area and capable of providing alternate methods to improve its character suitable to the project so that the structures built will be stable and serve.

TEXTBOOKS:

REFERENCES:
CE 8703 IRRIGATION ENGINEERING L T P C 3 0 0 3

OBJECTIVES:

• To introduce the student to the concept of soil-plant characteristics and their water requirements.
• To understand the necessity of planning an irrigation system to provide water at the right time and right place.

UNIT I  IRRIGATION PRINCIPLES  9
Need for irrigation – Advantages and ill effects – Development of irrigation – National Water Policy – Tamil Nadu scenario - Physical properties of soil that influence soil moisture characteristics – Concept of soil water potential and its components: Gravitational, Pressure and Osmotic- Retention of water in soils and concept of plant available water – Movement of water into and within the soils – Measurement of soil moisture content and the matric tension with which it is held.

UNIT II  CROP WATER REQUIREMENT  8

UNIT III  DIVERSION AND IMPOUNDING STRUCTURES  9

UNIT IV  CANAL IRRIGATION  11

UNIT V  IRRIGATION WATER MANAGEMENT  8

TOTAL: 45 PERIODS

OUT COMES:

• The students will have knowledge and skills on Planning, design, operation and management of reservoir system.

63
The student will gain knowledge on different methods of irrigation including canal irrigation.

TEXTBOOKS:

REFERENCES:

CE 8704  STRUCTURAL DYNAMICS AND EARTHQUAKE ENGINEERING  L T P C
3 0 0 3

OBJECTIVE:
- To provide a basic understanding of dynamic loading. Study the effect of earthquake loading on the behaviour of structures. Understand the codal provisions to design the structures as earthquake resistant.

UNIT I  SINGLE DEGREE OF FREEDOM SYSTEM 9
Definition of degree of freedom – Idealization of structure as SDOF system – Formulation of equation of motion for various SDOF system – D’Alemberts Principles – Effect of damping – Free and forced vibration of damped and undamped structures – Response to harmonic forces and periodic forces.

UNIT II  MULTI DEGREE OF FREEDOM SYSTEM 9

UNIT III  INTRODUCTION TO EARTHQUAKE ENGINEERING 9

UNIT IV  EARTHQUAKE EFFECTS ON STRUCTURES 9

UNIT V  CONCEPTS OF EARTHQUAKE RESISTANT DESIGN 9

TOTAL: 45 PERIODS

OUTCOMES:
- At the end of the course, student will have the knowledge to analyse structures subjected to dynamic loading and to design the structures for seismic loading as per code provisions.

TEXTBOOKS:

REFERENCES:
6. Moorthy.C.V.R., Earthquake Tips, NICEE, IIT Kanpur,

CE 8711 CREATIVE AND INNOVATIVE PROJECT
( Activity based - Subject related) L T P C 0 0 3 2

OBJECTIVE:
- To use the knowledge acquired in Civil Engineering to do a mini project, which allows the students to come up with designs, fabrication or algorithms and programs expressing their ideas in a novel way.

STRATEGY
To identify a topic of interest in consultation with Faculty/Supervisor. Review the literature and gather information pertaining to the chosen topic. State the objectives and develop a methodology to achieve the objectives. Carryout the design / fabrication or develop computer code. Demonstrate the novelty of the project through the results and outputs.

CE 8712 INDUSTRIAL TRAINING
(4 weeks – during VI semester – summer) L T P C 0 0 0 2

OBJECTIVE:
- To train the students in field work so as to have a first hand knowledge of practical problems in carrying out engineering tasks. To develop skills in facing and solving the field problems.

SYLLABUS:
The students individually undertake training in reputed civil engineering companies for the specified duration. At the end of the training, a report on the work done will be prepared and presented. The students will be evaluated through a viva-voce examination by a team of internal staff.
OUTCOMES:
At the end of the course the student will be able to understand
- The intricacies of implementation textbook knowledge into practice
- The concepts of developments and implementation of new techniques

CE 8713 IRRIGATION AND ENVIRONMENTAL ENGINEERING DRAWING L T P C 0 0 4 2

OBJECTIVE:
- At the end of the semester, the student shall conceive, design and draw the irrigation and environmental engineering structures in detail showing the plan, elevation and sections.

PART A: IRRIGATION ENGINEERING
1. TANK COMPONENTS
   Fundamentals of design - Tank surplus weir – Tank sluice with tower head - Drawings showing foundation details, plan and elevation.

2. IMPOUNDING STRUCTURES
   Design principles - Earth dam – Profile of Gravity Dam

3. CROSS DRAINAGE WORKS
   General design principles - Aqueducts – Syphon aqueduct (Type III) – Canal drop (Notch Type) – Drawing showing plan, elevation and foundation details.

4. CANAL REGULATION STRUCTURES
   General Principles - Direct Sluice - Canal regulator - Drawing showing detailed plan, elevation and foundation details.

PART B: ENVIRONMENTAL ENGINEERING
1. WATER SUPPLY AND TREATMENT
   Design and Drawing of flash mixer, flocculator, clarifier – Rapid sand filter – Service reservoirs – Pumping station – House service connection for water supply and drainage.

2. SEWAGE TREATMENT & DISPOSAL

TOTAL: 60 PERIODS

OUTCOMES:
- The students after completing this course will be able to design and draw various units of municipal water treatment plants and sewage treatment plants.

TEXTBOOKS:

REFERENCES:


7. Manual on Sewerage and Sewage Treatment, CPHEEO, Govt. of India, New Delhi, 1993.

CE 8811 PROJECT WORK

OBJECTIVE:

- To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same. To train the students in preparing project reports and to face reviews and viva voce examination.

SYLLABUS:

The student works on a topic approved by the head of the department under the guidance of a faculty member and prepares a comprehensive project report after completing the work to the satisfaction of the supervisor. The student will be evaluated based on the report and the viva voce examination by a team of examiners including one external examiner.

OUTCOMES:

- On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.

CE 8001 COMPUTER AIDED DESIGN OF STRUCTURES

OBJECTIVES:

- The overall idea of implementing a computer aided design with advantages and demerits. To learn different software techniques in finite element analysis and to optimize the structural components.

UNIT I INTRODUCTION

Fundamental reason for implementing CAD - Software requirements – Hardware components in CAD system – Design process - Applications and benefits.

UNIT II COMPUTER GRAPHICS

Graphic Software – Graphic primitives - Transformations - 2 Dimensional and 3 Dimensional
transformations – Concatenation - Wire frame modeling - Solid modeling - Graphic standards - Drafting packages – Auto CAD.

UNIT III  STRUCTURAL ANALYSIS  9

UNIT IV  DESIGN AND OPTIMIZATION  9
Principles of design of steel and RC structures - Beams and Columns - Applications to simple design problems - Optimization techniques - Algorithms - Linear programming.

UNIT V  EXPERT SYSTEMS  9
Introduction to artificial intelligence - Knowledge based expert systems – Applications of KBES- Rules and decision tables - Inference mechanisms - simple applications

OUTCOMES:
• Students will be able to implement ideas of computer aided design with advantages and demerits.

TEXTBOOKS:

REFERENCE:

CE 8002  DESIGN OF PLATE AND SHELL STRUCTURES  L T P C  3 0 0 3

OBJECTIVE:
• To learn the design of plate and shell and spatial structures

UNIT I  THIN PLATES WITH SMALL DEFLECTION  10
Laterally loaded thin plates - Governing differential equation, various boundary conditions.

UNIT II  RECTANGULAR PLATES  10
Simply supported rectangular plates - Navier solution and Levy’s method – Loading.

UNIT III  ANALYSIS OF THIN SHELLS  5
Shells of revolution – Spherical dome, Conical shell and ellipsoid of revolution – Shells of translation – Cylindrical shell and Hyperbolic paraboloid - Classification of shells - Types of shells - Structural action.

UNIT IV  DESIGN OF SHELLS  10
Spherical dome, Conical shell and Cylindrical shell.
UNIT V  SPACE FRAMES
Space Frames – Configuration – Types of nodes – General principles of design philosophy – Behaviour.

TOTAL: 45 PERIODS

OUTCOMES:
- The students will have indepth knowledge in the analysis and design of plates, shells and space frame structures

TEXTBOOKS:

REFERENCES:

CE 8003  DESIGN OF PRESTRESSED CONCRETE STRUCTURES  L T P C 3 0 0 3

OBJECTIVE:
- To understand the behaviour and performance of prestressed concrete structures. Compare the behaviour of prestressed concrete members with that of the normal reinforced concrete structures. Understand the performance of composite members. Finally to learn the design of prestressed concrete structures.

UNIT I  INTRODUCTION
Historical developments – Basic principles of prestressing – Classification and types – Advantages over ordinary reinforced concrete – Materials – High strength concrete and high tensile steel – Methods of prestressing – Freyssinet, Magnel, Lee-McCall and Gifford Udall anchorage systems – Analysis of sections of stresses by stress concept, strength concept and load balancing concept – Losses of prestress in post-tensioned and pre-tensioned members.

UNIT II  DESIGN FOR FLEXURE AND SHEAR
Basic assumptions for calculating flexural stresses – Permissible stresses in steel and concrete as per I.S.1343 Code – Design of sections of Type I and Type II post-tensioned and pre-tensioned beams – Check for strength limit based on I.S. 1343 Code – Layout of cables in post-tensioned beams – Location of wires in pre-tensioned beams – Design for shear based on I.S. 1343 Code.

UNIT III  DEFLECTION AND DESIGN OF ANCHORAGE ZONE
Factors influencing deflections – Short term deflections of uncracked members – Prediction of long term deflections due to creep and shrinkage – Check for serviceability limit state of deflection. Determination of anchorage zone stresses in post-tensioned beams by Magnel’s method, Guyon’s method and I.S. 1343 code – design of anchorage zone reinforcement – Check for transfer bond length in pre-tensioned beams.
UNIT IV  COMPOSITE BEAMS AND CONTINUOUS BEAMS  9
Analysis and design of composite beams – Methods of achieving continuity in continuous beams – Analysis for secondary moments – Concordant cable and linear transformation – Calculation of stresses – Principles of design.

UNIT V  MISCELLANEOUS STRUCTURES  9
Design of tension and compression members – Tanks, pipes and poles – Partial prestressing – Definition, methods of achieving partial prestressing, merits and demerits of partial prestressing.

OUTCOMES:

- Student shall have a knowledge on methods of prestressing and able to design various prestressed concrete structural elements.

TEXTBOOKS:


REFERENCES:


CE 8004  INDUSTRIAL STRUCTURES  L T P C
3 0 0 3

OBJECTIVE:

- To learn the layout, functional aspects and design of structures used in industries.

UNIT I  PLANNING  9
Classification of industries and industrial structures – General requirements of various industries – Planning and layout of buildings and components.

UNIT II  FUNCTIONAL REQUIREMENTS  9

UNIT III  DESIGN OF STEEL STRUCTURES  9
Industrial roofs – Crane girders – Mills buildings – Bunkers and Silos - Chimney.

UNIT IV  DESIGN OF R.C. STRUCTURES  9
Corbels, Brackets and Nibs - Silos and bunkers –Chimney - Principles of folded plates and shell roofs

UNIT V  PREFABRICATION  9
Principles of prefabrication – Prestressed precast roof trusses - Construction of roof and floor slabs - Wall panels.

TOTAL: 45 PERIODS
OUTCOMES:
- At the end of this course the student shall be able to design some of the structures used in industries.

TEXTBOOKS:

REFERENCES:

CE 8005 MAINTENANCE, REPAIR AND REHABILITATION OF STRUCTURES L T P C 3 0 0 3

OBJECTIVE:
- To get the knowledge on quality of concrete, durability aspects, causes of deterioration, assessment of distressed structures, repairing of structures and demolition procedures.

UNIT I MAINTENANCE AND REPAIR STRATEGIES 9
Maintenance, Repair and Rehabilitation, Facets of Maintenance, importance of Maintenance, Various aspects of Inspection, Assessment procedure for evaluating a damaged structure, causes of deterioration.

UNIT II STRENGTH AND DURABILITY OF CONCRETE 9
Quality assurance for concrete – Strength, Durability and Thermal properties, of concrete - Cracks, different types, causes – Effects due to climate, temperature, Sustained elevated temperature, Corrosion - - Effects of cover thickness.

UNIT III SPECIAL CONCRETES 9

UNIT IV TECHNIQUES FOR REPAIR AND PROTECTION METHODS 9
Non-destructive Testing Techniques, Epoxy injection, Shoring, Underpinning, Corrosion protection techniques – Corrosion inhibitors, Corrosion resistant steels, Coatings to reinforcement, cathodic protection.

UNIT V REPAIR, REHABILITATION AND RETROFITTING OF STRUCTURES 9
Strengthening of Structural elements, Repair of structures distressed due to corrosion, fire, leakage, earthquake.

71
DEMOLITION TECHNIQUES
Engineered demolition methods - Case studies.

OUTCOMES:
- Students must gain knowledge on quality of concrete, durability aspects, causes of deterioration, assessment of distressed structures, repairing of structures and demolition procedures.

REFERENCES:

CE8006 POWER PLANT STRUCTURES

OBJECTIVE:
- To study the layout, functional aspects and principles involved in the selection of different types of Power Plant Structures.

UNIT I FUNDAMENTALS OF POWER PLANTS

UNIT II HYDRO ELECTRIC POWER PLANTS
Elements of hydro-electric power plants – Advantages and disadvantages of water power – General and essential elements of Hydro electric Power Plant – Structural requirements – Selection of site for hydro electric plant – Penstocks and surge Tanks in Power Station.

UNIT III THERMAL POWER PLANTS
Planning, Analysis of thermal power plants – Layout – Ash handling – Dust collection – Induced draught and natural cooling towers – Air/water pollution by thermal power plants.

UNIT IV NUCLEAR POWER PLANTS

UNIT V NON CONVENTIONAL POWER PLANTS

TOTAL: 45 PERIODS
OUTCOMES

- The student will be able to understand the operations of different types of power plants. The students will be able to analyse and design various power plant components like surge tanks, cooling towers and containment structures.

TEXTBOOKS:

REFERENCES:

CE 8007  
PREFABRICATED STRUCTURES  
L T P C  
3 0 0 3

OBJECTIVE:
- To learn the design of prefabricated structures

UNIT I  
INTRODUCTION  
10

UNIT II  
PREFABRICATED COMPONENTS  
10
Behaviour of structural components – Large panel constructions – Construction of roof and floor slabs Wall panels – Columns – Shear walls.

UNIT III  
DESIGN PRINCIPLES  
10
Design of Structural components - Beam Column Corbel Stress limitations – Handling without cracking, handling with controlled cracking – Design for stripping forces

UNIT IV  
JOINTS IN STRUCTURAL MEMBERS  
8
Joints for different structural connections – Beam to Column, Beam to Beam, Column to Column, Column to Foundation, Connections between wall panels, Connections between floor panels - Dimensions and detailing – Design of expansion joints- Jointing Materials.

UNIT V  
DESIGN FOR EARTHQUAKES AND CYCLONES  
7
Progressive collapse – Codal provisions – Equivalent design loads for considering abnormal effects such as earthquakes, cyclones etc. - Importance of avoidance of progressive collapse.

TOTAL: 45 PERIODS

OUTCOMES:
- The student shall be able to design some of the prefabricated elements and also have the knowledge of the construction methods in using these elements.

TEXTBOOKS:

REFERENCES:
2. Glover C.W, Structural Precast Concrete, Asia Publishing House, 1965

CE 8008 TALL STRUCTURES L T P C
3 0 0 3

OBJECTIVE:
- To provide an insight to the design of tall buildings. To enlighten the students on modern techniques available for the analysis of tall buildings.

UNIT I DESIGN CRITERIA AND MATERIALS 8
Design Philosophy - Modern concepts – Materials used - High Performance Concrete, Fibre Reinforced Concrete, Light weight concrete, Self Compacting Concrete, Glass, High strength steel.

UNIT II LOADING 9

UNIT III BEHAVIOUR OF STRUCTURAL SYSTEMS 9
Factors affecting the growth, height and structural form, Behaviour of Braced frames, Rigid Frames, in filled frames, Shear walls, Coupled Shear walls, Wall – Frames, Tubular, Outrigger braced, Hybrid systems.

UNIT IV ANALYSIS 10
Modeling for approximate analysis, Accurate analysis and reduction techniques, Analysis of structures as an integral unit, Analysis for member forces, drift and twist. Computerized 3D analysis, Evaluation of frequency of vibration of structures – Buckling analysis of tall structures

UNIT V DESIGN PARAMETERS 9
Design for differential movement, Creep and Shrinkage effects, Temperature Effects and Fire Resistance.

TOTAL: 45 PERIODS

OUTCOMES:
- At the end of this course the student should have an understanding on the behaviour of tall buildings subjected to lateral building. The students should have knowledge about the principles of designing safer tall structures as per the existing codes.
TEXTBOOKS:

REFERENCES:

CE 8009 GEO-ENVIRONMENTAL ENGINEERING L T P C 3 0 0 3

OBJECTIVE:
- The student acquires the knowledge on the Geotechnical engineering problems associated with soil contamination, safe disposal of waste and remediate the contaminated soils by different techniques thereby protecting environment.

UNIT I GENERATION OF WASTES AND CONSEQUENCES OF SOIL POLLUTION 8
Introduction to Geoenvironmental engineering – environmental cycle – sources, production and classification of waste – causes of soil pollution – factors governing soil pollution interaction clay minerals failures of foundation due to waste movement.

UNIT II SITE SELECTION AND SAFE DISPOSAL OF WASTE 10

UNIT III TRANSPORT OF CONTAMINANTS 8

UNIT IV WASTE STABILIZATION 10

UNIT V REMEDIATION OF CONTAMINATED SOILS 9
Ex situ and insitu remediation-solidification, bio-remediation, incineration, soil washing, electro kinetics, soil heating, vetrification, bio-venting

TOTAL: 45 PERIODS

OUTCOMES:
The students completing the course will have ability to
- describe the fundamentals of Geo-environmental engineering and waste soil interactions
- carryout advanced soil characterisation
apply soil-water-contaminant interactions in the design of waste containment systems and contaminated site remediation

TEXTBOOKS:

REFERENCES:

CE 8010 INTRODUCTION TO SOIL DYNAMICS AND MACHINE FOUNDATIONS  L T P C 3 0 0 3

OBJECTIVE:
- At the end of the course, student is expected to assess various design dynamic properties of soil, design of foundation for common machineries and also about the measures to isolate vibration due to the operations of machines.

UNIT I THEORY OF VIBRATION 9
Vibration of elementary systems-vibratory motion-single degree freedom system-free and forced vibration with and without damping. Principles of vibration measuring instruments.

UNIT II WAVES AND WAVE PROPAGATION 9
Wave propagation in an elastic homogeneous isotropic medium-Rayleigh, shear and compression waves-waves in elastic half space.

UNIT III DYNAMIC PROPERTIES OF SOILS 9

UNIT IV DESIGN PROCEDURES 9
Design criteria – dynamic loads – simple design procedures for foundations of reciprocating, impact and rotary type machines - Codal provisions (Simple cases).

UNIT V VIBRATION ISOLATION 9
Vibration isolation technique - foundation isolation - isolation by location-isolation by barriers-active and passive isolation methods.

TOTAL: 45 PERIODS

OUTCOMES:
- Students are able to perform site specific response analysis to develop design spectra and to do detailed liquefaction analysis using SPT data.
TEXTBOOKS:

REFERENCES:

CE 8011 PAVEMENT ENGINEERING L T P C 3 0 0 3

OBJECTIVE:
• Student gains knowledge on various IRC guidelines for designing rigid and flexible pavements. Further, he/she will be in a position to assess quality and serviceability conditions of roads.

UNIT I TYPE OF PAVEMENT AND STRESS DISTRIBUTION ON LAYERED SYSTEM 8
Introduction – Pavement as layered structure – Pavement types rigid and flexible. Resilient modulus - Stress and deflections in pavements under repeated loading.

UNIT II DESIGN OF FLEXIBLE PAVEMENTS 10
Flexible pavement design factors influencing design of flexible pavement, Empirical - Semi empirical and theoretical methods – Design procedure as per IRC guidelines – Design and specification of rural roads.

UNIT III DESIGN OF RIGID PAVEMENTS 9
Cement concrete pavements factors influencing CC pavements – Modified Westergaard approach – Design procedure as per IRC guidelines – Concrete roads and their scope in India.

UNIT IV PERFORMANCE EVALUATION AND MAINTENANCE 10

UNIT V STABILIZATION OF PAVEMENTS 8

TOTAL : 45 PERIODS

OUTCOMES:
• Students will have adequate knowledge to design flexible and rigid pavements based on IRC guidelines. Further they know various techniques to evaluate performance of pavements.
TEXTBOOKS:

REFERENCES:

CE 8012 ROCK ENGINEERING L T P C 3 0 0 3

OBJECTIVE:
- To impart knowledge on fundamentals of rock mechanics and its application in solving simple problems associated with rock slopes and underground openings. Student gains the knowledge on the mechanics of rock and its applications in underground structures and rock slope stability analysis.

UNIT I CLASSIFICATION AND INDEX PROPERTIES OF ROCKS 6
Geological classification – Index properties of rock systems – Classification of rock masses for engineering purpose.

UNIT II ROCK STRENGTH AND FAILURE CRITERIA 12

UNIT III INITIAL STRESSES AND THEIR MEASUREMENTS 10
Estimation of initial stresses in rocks – influence of joints and their orientation in distribution of stresses – measurements of in-situ stresses.

UNIT IV APPLICATION OF ROCK MECHANICS IN ENGINEERING 10

UNIT V ROCK BOLTING 7

TOTAL: 45 PERIODS

OUTCOME:
- Graduates will demonstrates basic knowledge of rock mechanics and able to design effectively slopes, underground openings, foundations and other geotechnical related problems in different types of rocks.
TEXTBOOKS:

REFERENCES:

CE 8013 TRAFFIC ENGINEERING AND MANAGEMENT

OBJECTIVE:
- To give an overview of Traffic engineering, various surveys to be conducted, traffic regulation, management and traffic safety.

UNIT I TRAFFIC CHARACTERISTICS
10
Road Characteristics – Classification – Functions and standards – Road user characteristics – PIEV theory – Vehicle – Performance characteristics – Fundamentals of Traffic Flow – Urban Traffic problems in India

UNIT II TRAFFIC SURVEYS
7

UNIT III TRAFFIC ENGINEERING REGULATION AND CONTROL
8

UNIT IV TRAFFIC SAFETY AND ENVIRONMENT
10
Road accidents – Causes, effect, prevention, and cost – street lighting – Traffic and environment hazards – Air and Noise Pollution, causes, health effects and abatement measures.

UNIT V TRAFFIC MANAGEMENT
10
Area Traffic Management System – One way street system, exclusive traffic lanes, tidal flow operation, staggering of work hours and road pricing – Non road pricing options _ Parking charges, Public transport, Subsidies, Vehicle License fees, Road Building, Permit system, Physical Traffic Management Transport System Management (TSM) and Transport Demand Management (TDM).

TOTAL: 45 PERIODS

OUTCOME
- Students would have gained knowledge on characteristics of traffic elements, traffic survey, traffic regulation and traffic management measures.
TEXTBOOKS:
4. Indian Roads Congress (IRC) Specifications: Guidelines and special publications on Traffic Planning and Management.

REFERENCES:

CE 8014 TRANSPORT AND ENVIRONMENT 3 0 0 3

OBJECTIVE:
- The objective of this course is to create an awareness / overview of the impact of Transportation Projects on the environment and society.

UNIT I INTRODUCTION 8
Environmental Inventory, Environmental Assessment, Environmental Impact Assessment (EIA), Environmental Impact of Transportation Projects, Need for EIA, EIA Guidelines for Transportation Project, Historical Development.

UNIT II METHODOLOGIES 8
Elements of EIA – Screening and Scoping – Methods of Impact Analysis – Applications – Appropriate methodology.

UNIT III ENVIRONMENTAL IMPACT, PREDICTION AND ASSESSMENT 10
Prediction and Assessment of Impact of Transportation Project at various stages on water, air, noise, land acquisition and resettlement, Socio economic impact, indigenous people, aesthetics, health and safety, energy studies, IRC guidelines.

UNIT IV ENVIRONMENTAL MITIGATION AND MANAGEMENT PLAN 10

UNIT V EIA CASE STUDIES 9
EIA Case Studies on Highway, Railway, Airways and Waterways Projects

TOTAL: 45 PERIODS
OUTCOME
- Students would have understood the impact of Transportation projects on the environment, Environmental Laws on Transportation Projects and the mitigative measures adopted in the planning stage.

TEXTBOOKS:

REFERENCES:

CE 8015   TRANSPORTATION PLANNING AND SYSTEMS L T P C 3 0 0 3

OBJECTIVE:
- To give an exposure on overview of the principles of the bus and rail transportation planning and evaluation of the transportation projects.

UNIT I   STUDY AREA AND SURVEYS 10
Importance of planning and integrated transport facilities in urban areas – Delineation of study area and zoning – Conducting various surveys – Travel patterns, transport facilities and planning parameters.

UNIT II   MODES 7
Basics of trip generation – Trip distribution – Trip assignment and modal split models – Validation of the model.

UNIT III   PLAN PREPARATION AND EVALUATION 8

UNIT IV   BUS TRANSPORTATION 10
Characteristics and bus transportation in urban areas – Fare policy – Route planning – Planning of terminals – Break even point and its relevance.

UNIT V   RAIL TRANSPORTATION 10
Characteristics of suburban, IRT and RRT systems – Planning of rail terminals – Fare policy – Unified traffic and transport authority.
OUTCOME

The students would have gained knowledge on comprehensive traffic and transport planning for cities with special emphasis on bus and rail system planning.

TEXTBOOKS:

REFERENCES:

CE 8016 URBAN PLANNING AND DEVELOPMENT L T P C 3 0 0 3

OBJECTIVES:
To enable students to have the knowledge on planning process and to introduce to the students about the regulations and laws related to Urban Planning.

UNIT I BASIC ISSUES 8
Definition of Human settlement, Urban area, Town, City, Urbanisation, Suburbanisation, Urban sprawl, Peri-urban areas, Central Business District (CBD), Classification of urban areas – Trend of Urbanisation at International, National, Regional and State level.

UNIT II PLANNING PROCESS 8

UNIT III DEVELOPMENT PLANS, PLAN FORMULATION AND EVALUATION 10
Scope and Content of Regional Plan, Master Plan, Detailed Development Plan, Development Control Rules, Transfer of Development Rights, Special Economic Zones.

UNIT IV PLANNING AND DESIGN OF URBAN DEVELOPMENT PROJECTS 9

UNIT V LEGISLATION, DEVELOPMENT AND MANAGEMENT OF URBAN SYSTEM 10
Town and Country Planning Act, Land Acquisition and Resettlement Act etc., Urban Planning Standards and Regulations, Involvement of Public, Private, NGO, CBO and Beneficiaries.

OUTCOMES:
The students completing the course will have the ability to

- describe basic issues in urban planning
- formulate plans for urban and rural development
- plan and analyse socio economic aspects of urban and rural planning
REFERENCES:
2. Tamil Nadu Town and Country Planning Act 1971, Government of Tamil Nadu, Chennai

GE 8073  HUMAN RIGHTS  L T P C  3 0 0 3

OBJECTIVES:
- To sensitize the Engineering students to various aspects of Human Rights.

UNIT I
9

UNIT II
9

UNIT III
9
Theories and perspectives of UN Laws – UN Agencies to monitor and compliance.

UNIT IV
9
Human Rights in India – Constitutional Provisions / Guarantees.

UNIT V
9

TOTAL : 45 PERIODS

OUTCOME:
- Engineering students will acquire the basic knowledge of human rights.

REFERENCES:
OBJECTIVES:

- The course explains various moral issues through predominant theories. It educates the code of ethics as well as the industry standards and how they can be used for ensuring safety and reducing the risk. The course enunciated the Rights and Responsibilities of individuals. Various other ethical global issues also have been explained along with case studies.

UNIT I  HUMAN VALUES  10

UNIT II  ENGINEERING ETHICS  9

UNIT III  ENGINEERING AS SOCIAL EXPERIMENTATION  9
Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law – The Challenger Case Study

UNIT IV  SAFETY, RESPONSIBILITIES AND RIGHTS  9

UNIT V  GLOBAL ISSUES  8

TOTAL : 45 PERIODS

OUTCOMES:
- Upon completion of the course, the student should be able to apply ethics in society, discuss the ethical issues related to engineering and realize the responsibilities and rights in the society.

TEXTBOOK :

REFERENCES:

Web sources:
1. www.onlineethics.org
2. www.nspe.org
3. www.globalethics.org
4. www.ethics.org

CE 8017 AIR POLLUTION AND CONTROL ENGINEERING

OBJECTIVE:
- To impart knowledge on the principle and design of control of Indoor/ particulate/ gaseous air pollutant and its emerging trends.

UNIT I INTRODUCTION 7
Structure and composition of Atmosphere – Definition, Scope and Scales of Air Pollution – Sources and classification of air pollutants and their effect on human health, vegetation, animals, property, aesthetic value and visibility- Ambient Air Quality and Emission standards –Ambient and stack sampling and Analysis of Particulate and Gaseous Pollutants.

UNIT II METEOROLOGY 6

UNIT III CONTROL OF PARTICULATE CONTAMINANTS 11

UNIT IV CONTROL OF GASEOUS CONTAMINANTS 11

UNIT V INDOOR AIR QUALITY MANAGEMENT 10
Sources types and control of indoor air pollutants, sick building syndrome types – Radon Pollution and its control- Sources and Effects of Noise Pollution – Measurement – Standards –Control and Preventive measures.

TOTAL: 45 PERIODS

OUTCOMES:
The students completing the course will have
- an understanding of the nature and characteristics of air pollutants, noise pollution and basic concepts of air quality management
- ability to identify, formulate and solve air and noise pollution problems
- ability to design stacks and particulate air pollution control devices to meet applicable standards.
TEXTBOOKS:

REFERENCES:

CE 8018  ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT  L T P C
3 0 0 3

OBJECTIVE:
- To impart the knowledge and skills to identify, assess and mitigate the environmental and social impacts of developmental projects

UNIT I  INTRODUCTION

UNIT II  ENVIRONMENTAL ASSESSMENT
Baseline monitoring, Prediction and Assessment of Impact on land, water, air, noise and energy, flora and fauna - Matrices – Networks – Checklist Methods - Mathematical models for Impact prediction – Analysis of alternatives

UNIT III  ENVIRONMENTAL MANAGEMENT PLAN

UNIT IV  SOCIO ECONOMIC ASSESSMENT
Baseline monitoring of Socio economic environment – Identification of Project Affected Personal – Rehabilitation and Resettlement Plan - Economic valuation of Environmental impacts – Cost benefit Analysis - Public Consultation

UNIT V  CASE STUDIES

TOTAL: 45 PERIODS

OUTCOMES:
The students completing the course will have ability to
- carry out scoping and screening of developmental projects for environmental and social assessments
• explain different methodologies for environmental impact prediction and assessment
• plan environmental impact assessments and environmental management plans
• evaluate environmental impact assessment reports

TEXTBOOKS:

REFERENCES:

CE 8019 INDUSTRIAL WASTEWATER ENGINEERING
L T P C
3 0 0 3

OBJECTIVE:
• To provide knowledge on sources and characteristics of Industrial Wastewaters, Techniques and approaches for minimizing the generation of wastewaters at the source and application of physico-chemical, biological and advanced treatment methods for recovery, reuse and disposal of wastewaters in Indian Industries.

UNIT I INTRODUCTION
8

UNIT II INDUSTRIAL POLLUTION PREVENTION
8
Prevention Vs Control of Industrial Pollution – Benefits and Barriers – Waste Minimization Strategies – Evaluation of Pollution Prevention Options – Cost benefit analysis – Pay back period.

UNIT III TREATMENT OF INDUSTRIAL WASTEWATERS
10
UNIT IV  WASTEWATER REUSE AND RESIDUAL MANAGEMENT


UNIT V  CASE STUDIES

Industrial manufacturing process description, Wastewater characteristics, Pollution Prevention Options and Treatment Flow sheets for selected Industries – Tanneries- Textiles- Pulp and Paper – Metal finishing – Sugar and Distilleries.

TOTAL: 45 PERIODS

OUTCOMES:
The students completing the course will have
- an insight into the pollution from major industries including the sources and characteristics of pollutants
- ability to plan minimization of industrial wastes
- ability to design facilities for the processing and reclamation of industrial waste water

TEXTBOOKS:

REFERENCES:

CE 8020  MUNICIPAL SOLID WASTE MANAGEMENT  L T P C
3 0 0 3

OBJECTIVE:
- To make the students conversant with different aspects of the types, sources, generation, storage, collection, transport, processing and disposal of municipal solid waste.

UNIT I  SOURCES AND TYPES
Sources and types of municipal solid wastes-waste generation rates-factors affecting generation, characteristics-methods of sampling and characterization; Effects of improper disposal of solid wastes-Public health and environmental effects. Elements of solid waste management – Social and Financial aspects – Municipal solid waste (M&H) rules – integrated management-Public awareness; Role of NGO’s.
UNIT II ON-SITE STORAGE AND PROCESSING 8

UNIT III COLLECTION AND TRANSFER 8
Methods of Residential and commercial waste collection – Collection vehicles – Manpower – Collection routes – Analysis of collection systems; Transfer stations – Selection of location, operation & maintenance; options under Indian conditions – Field problems- solving.

UNIT IV OFF-SITE PROCESSING 12
Objectives of waste processing – Physical Processing techniques and Equipments; Resource recovery from solid waste composting and biomethanation; Thermal processing options – case studies under Indian conditions.

UNIT V DISPOSAL 9
Land disposal of solid waste; Sanitary landfills – site selection, design and operation of sanitary landfills – Landfill liners – Management of leachate and landfill gas- Landfill bioreactor – Dumpsite Rehabilitation

TOTAL: 45 PERIODS

OUTCOMES:
The students completing the course will have

- an understanding of the nature and characteristics of municipal solid wastes and the regulatory requirements regarding municipal solid waste management
- ability to plan waste minimisation and design storage, collection, transport, processing and disposal of municipal solid waste

TEXTBOOKS:
2. Paul T Williams (2000), Waste Treatment and Disposal, John Wiley and Sons

REFERENCES:

GE 8072 DISASTER MANAGEMENT L T P C
3 0 0 3

OBJECTIVES:
- To provide students an exposure to disasters, their significance and types.
- To ensure that students begin to understand the relationship between vulnerability, disasters, disaster prevention and risk reduction
- To gain a preliminary understanding of approaches of Disaster Risk Reduction (DRR)
- To enhance awareness of institutional processes in the country and
- To develop rudimentary ability to respond to their surroundings with potential disaster response in areas where they live, with due sensitivity
UNIT I  INTRODUCTION TO DISASTERS  
Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Disasters: Types of disasters – Earthquake, Landslide, Flood, Drought, Fire etc. - Classification, Causes, Impacts including social, economic, political, environmental, health, psychosocial, etc.- Differential impacts- in terms of caste, class, gender, age, location, disability - Global trends in disasters: urban disasters, pandemics, complex emergencies, Climate change- Dos and Don'ts during various types of Disasters.

UNIT II  APPROACHES TO DISASTER RISK REDUCTION (DRR)  
Disaster cycle - Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, Roles and responsibilities of community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), States, Centre, and other stake-holders- Institutional Processess and Framework at State and Central Level-State Disaster Management Authority(SDMA) – Early Warning System – Advisories from Appropriate Agencies.

UNIT III  INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT  
Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc.- Climate Change Adaptation- IPCC Scenario and Scenarios in the context of India - Relevance of indigenous knowledge, appropriate technology and local resources.

UNIT IV  DISASTER RISK MANAGEMENT IN INDIA  
Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, Disaster Management Act and Policy - Other related policies, plans, programmes and legislation – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.

UNIT V  DISASTER MANAGEMENT: APPLICATIONS AND CASE STUDIES AND FIELD WORKS  
Landslide Hazard Zonation: Case Studies, Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.

TOTAL: 45 PERIODS

OUTCOMES:
The students will be able to
- Differentiate the types of disasters, causes and their impact on environment and society
- Assess vulnerability and various methods of risk reduction measures as well as mitigation.
- Draw the hazard and vulnerability profile of India, Scenario in the Indian context, Disaster damage assessment and management.

TEXTBOOKS:

REFERENCES:
1. Govt. of India: Disaster Management Act, Government of India, New Delhi, 2005

OBJECTIVE:
- To introduce the student to the concept of hydrological aspects of water availability and requirements and should be able to quantify, control and regulate the water resources.

UNIT I PRECIPITATION AND ABSTRACTIONS

UNIT II RUNOFF
Watershed, catchment and basin - Catchment characteristics - factors affecting runoff - Runoff estimation using empirical - Strange’s table and SCS methods – Stage discharge relationships - flow measurements - Hydrograph – Unit Hydrograph – IUH

UNIT III FLOOD AND DROUGHT
Natural Disasters - Flood Estimation - Frequency analysis - Flood control - Definitions of droughts - Meteorological, hydrological and agricultural droughts - IMD method - NDVI analysis - Drought Prone Area Programme (DPAP)

UNIT IV RESERVOIRS
Classification of reservoirs, General principles of design, site selection, spillways, elevation - area - capacity - storage estimation, sedimentation - life of reservoirs – rule curve

UNIT V GROUNDWATER AND MANAGEMENT
Origin - Classification and types - properties of aquifers - governing equations – steady and unsteady flow - artificial recharge - RWH in rural and urban areas

OUTCOMES:
- The students gain the knowledge needed on hydrologic cycle, hydrometeorology and formation of precipitation.
- The students are able to apply the various methods of field measurements and empirical formulae for estimating the various losses of precipitation, stream flow, flood and flood routing.
- The students will know the basics of groundwater and hydraulics of subsurface flows

TEXTBOOKS:
REFERENCES:

AI 8551 INTEGRATED WATER RESOURCES MANAGEMENT L T P C 3 0 0 3

OBJECTIVES:
• To introduce the students to the interdisciplinary analysis of water and design of intervention strategies.
• To develop knowledge base on capacity building on Integrated Water Resources Management (IWRM).

UNIT I IWRM FRAMEWORK 9
Definition – meanings –objectives- evolution of IWRM- IWRM relevance in water resources management – Importance of paradigm shift in India: processes and prospective outcomes.

UNIT II CONTEXTUALIZING IWRM 9
IWRM in Global and Regional water partnership - MDG goals - UN formulations-Institutional Transformation- bureaucratic reforms and inclusive development.

UNIT III EMERGING ISSUES IN WATER MANAGEMENT 9

UNIT IV IWRM AND WATER RESOURCES DEVELOPMENT IN INDIA 9

UNIT V ASPECTS OF INTEGRAL DEVELOPMENT 9
Capacity building - Solutions for effective Water Management. Case studies on conceptual framework of IWRM – IWRM and regional and global partnership – Emerging issues – IWRM and water resources development

TOTAL: 45 PERIODS

OUTCOME:
• At the completion of the course the student should be able to apply appropriate management techniques for planning, operating and maintaining the different components of integrated water resources and drainage system.

TEXTBOOKS:

REFERENCES:

AI 8751 PARTICIPATORY WATER RESOURCES MANAGEMENT L T P C
3 0 0 3

OBJECTIVE:
- To gain an insight on local and global perceptions and approaches on participatory water resource management

UNIT I FUNDAMENTALS: SOCIOLOGY AND PARTICIPATORY APPROACH 6
Sociology – Basic concepts – Perspectives- Social Stratification – Irrigation as a Socio technical Process - Participatory concepts– Objectives of participatory approach

UNIT II UNDERSTANDING FARMERS PARTICIPATION 10

UNIT III ISSUES IN WATER MANAGEMENT 9
Multiple use of water – Issues in Inter-sectoral Water Allocation - domestic, irrigation, industrial sectors - modernization techniques – Rehabilitation – Command Area Development - Water delivery systems

UNIT IV PARTICIPATORY WATER CONSERVATION 10

UNIT V PARTICIPATORY WATERSHED DEVELOPMENT 10
Concept and significance of watershed - Basic factors influencing watershed development — Principles of watershed management - Definition of watershed management – Identification of problems - Watershed approach in Government programmes — People’s participation – Entry point activities - Evaluation of watershed management measures.

TOTAL: 45 Periods

OUTCOMES:
- The students shall gain knowledge on the various processes involved in participatory water resource management.
- The students shall be aware of the issues related to water conservation.

TEXTBOOKS:
OBJECTIVES:
- To provide an overview of the analysis and design procedures used in the field of coastal engineering
- To enable students to determine the characteristics of waves, coastal structures and shore protection and modeling in coastal engineering

UNIT I INTRODUCTION TO COASTAL ENGINEERING

UNIT II WAVE PROPERTIES AND ANALYSIS

UNIT III TYPES AND WAVE TRANSFORMATION
Tide analysis and prediction, storm surge, seiches and seasonal fluctuations - Long term water level fluctuations – Wave shoaling; wave refraction; wave breaking; wave diffraction

UNIT IV COASTAL STRUCTURES AND SHORE PROTECTION
Risk analysis – design wave – Break waters – Shore protection – groins, seal walls, offshore breakwaters, artificial nourishment

UNIT V MODELING IN COASTAL ENGINEERING
Physical modeling in Coastal Engineering – Limitations and advantages – Role of physical modeling in coastal engineering – Numerical modeling – Modeling aspects – limitations

OUTCOME:
On successfully completing this course unit, students will be able to:
- Calculate the wave transformations
- Appreciate the multi-faceted nature of coastal problems and the techniques of coastal engineering analysis, modeling and design of coastal structures and shore protection.

TEXTBOOKS:
REFERENCES:

CE 8022  GROUNDWATER ENGINEERING  L T P C
3 0 0 3

OBJECTIVES:
• To introduce the student to the principles of Groundwater governing equations and characteristics of different aquifers,
• To understand the techniques of development and management of groundwater.

UNIT I  HYDROGEOLOGICAL PARAMETERS

UNIT II  WELL HYDRAULICS

UNIT III  GROUNDWATER MANAGEMENT

UNIT IV  GROUNDWATER QUALITY
Ground water chemistry - Origin, movement and quality - Water quality standards – Health and aesthetic aspects of water quality - Saline intrusion – Environmental concern and Regulatory requirements

UNIT V  GROUNDWATER CONSERVATION
Artificial recharge techniques – Remediation of Saline intrusion– Ground water management studies – Protection zone delineation, Contamination source inventory, remediation schemes - Ground water Pollution and legislation.

TOTAL: 45 PERIODS

OUTCOMES:
• Students will be able to understand aquifer properties and its dynamics after the completion of the course. It gives an exposure towards well design and practical problems of groundwater aquifers.
• Students will be able to understand the importance of artificial recharge and groundwater quality concepts.
TEXTBOOKS:

REFERENCES:

CE 8023 WATER RESOURCES SYSTEMS ENGINEERING L T P C 3 0 0 3

OBJECTIVES:
• To introduce the student to the concept of Mathematical approaches for managing the water resources system.
• To make the students apply an appropriate system approach to optimally operate a water resource system.

UNIT I SYSTEM APPROACH 7
Philosophy of modelling – Goals and Objectives – Basics of system analysis concept – scopes and steps in systems engineering.

UNIT II PHYSICAL AND SOCIO - ECONOMIC DATA 6
Collection, evaluation and processing – project appraisal – public involvement, master Comprehensive and integrated planning of water resources project.

UNIT III LINEAR PROGRAMMING 10
Operation research - introduction - Problem Formulation-graphical solution- Simplex method – Sensitivity analysis - simple applications

UNIT IV DYNAMIC PROGRAMMING 11
Optimality criteria Stage coach problem – Bellman’s optimality criteria Problem formulation and Solution - simple applications

UNIT V SIMULATION 11
Basic principles – Methodology and Philosophy – Model development – input and outputs – Deterministic simulation - simple applications

TOTAL: 45 PERIODS

OUTCOMES:
• The students will be exposed to the economical aspects and analysis of water resources systems by which they will get an idea of comprehensive and integrated planning of a water resources project.
• The students will develop skills in solving problems in operations research through LP, DP and Simulation techniques.

TEXTBOOK:

REFERENCES:

**CE 8024  GEOUNFORMATS APPLICATIONS FOR CIVIL ENGINEERS**

**OBJECTIVE:**
- To solve the Civil Engineering problems with the help of Geoinformatics technique.

**UNIT I  LAND RESOURCE MANAGEMENT**
6
- Total Station and GPS Surveys – Topographic and Bathymetric Surveys – Cadastral Information – Soil and Land Use Surveys - Land Information System (LIS) – Real Estate Information System

**UNIT II  STRUCTURAL STUDIES**
6
- Deformation studies of deflection - Dam deformation - structural movement - Pavement yield - shifting sand-bank and shoreline – Landslide Risk Analysis

**UNIT III  SOIL CONSERVATION AND MANAGEMENT**
9
- Soil survey interpretation and mapping - impact of agricultural and industrial activity on soil properties - soil erosion - factors influencing soil erosion - soil contamination using Hyper spectral Remote Sensing - mining pollution- EMR responses with contaminated soil - modeling soil characteristics using satellite data - soil degradation assessment using Remote Sensing and GIS - Land reclamation studies -

**UNIT IV  URBAN AND TRANSPORTATION MANAGEMENT**
12

**UNIT V  WATER RESOURCES PLANNING AND MANAGEMENT**
12

**TOTAL: 45 PERIODS**

**OUTCOME:**
- The student shall be capable of solving Civil Engineering problems with Geoinformatics technology.

**REFERENCES:**
OBJECTIVES:
• To introduce Cartography as science and technology of Map Making.
• The course also introduces its connections with Communication Science, Computer technology and IT.
• To outline the Cartography as a creative art.

UNIT I
MAP – A SPECIAL GRAPHIC COMMUNICATOR

UNIT II
ABSTRACTION OF EARTH AND MAP PROJECTION

UNIT III
MAP COMPILATION AND DESIGN
Base map concepts – scanning and digitization – planimetric, topographic and thematic information – sample and census surveys – attribute data tables – Elements of a map - Map Layout principles – Map Design fundamentals – symbols and conventional signs - graded and ungraded symbols - color theory - colours and patterns in symbolization – map lettering

UNIT IV
MAP MAKING

UNIT V
MAP TRANSFORMATIONS

TOTAL: 45 PERIODS
OUTCOMES:
At the end of the course, the student shall
- Be familiar with appropriate map projection and co-ordinate system for production of maps.
- Be able compile and design maps for the required purpose.
- Be familiar with co-ordinate and datum transformations.

TEXTBOOKS:

REFERENCES:
4. Thematic Cartography and Geovisualisation 3rd edition by Terry A slocum, Robert B McMaster, fritz C Kessler, Hugh H Howard, 2008 Pretice Hall

GI 8451 TOTAL STATION AND GPS SURVEYING

OBJECTIVE:
- To understand the working of Total Station equipment and solve the surveying problems.

UNIT I FUNDAMENTALS OF TOTAL STATION AND GPS
Methods of Measuring Distance, Basic Principles of Total Station, Historical Development, Classifications, applications and comparison with conventional surveying. Basic concepts of GPS - Historical perspective and development - applications - Geoid and Ellipsoid- satellite orbital motion - Keplerian motion – Kepler’s Law - Perturbing forces - Geodetic satellite - Doppler effect - Positioning concept – GNSS

UNIT II ELECTROMAGNETIC WAVES
Classification - applications of Electromagnetic waves, Propagation properties, wave propagation at lower and higher frequencies- Refractive index (RI) - factors affecting RI- Computation of group for light and near infrared waves at standard and ambient conditions- Computation of RI for microwaves at ambient condition - Reference refractive index- Real time application of first velocity correction. Measurement of atmospheric parameters- Mean refractive index- Second velocity correction -Total atmospheric correction- Use of temperature- pressure transducers.

UNIT III ELECTRO OPTICAL AND MICRO WAVE SYSTEM
UNIT IV  SATELLITE SYSTEM  9
GPS - Different segments - space, control and user segments - satellite configuration - GPS signal structure - Orbit determination and representation - Anti Spoofing and Selective Availability - Task of control segment - GPS receivers.

UNIT V  GPS DATA PROCESSING  9
GPS observables - code and carrier phase observation - linear combination and derived observables - concept of parameter estimation – downloading data - data processing – software modules - solutions of cycle slips, ambiguities, RINEX format. Concepts of rapid, static methods with GPS - semi Kinematic and pure Kinematic methods - basic constellation of satellite geometry & accuracy measures - applications- long baseline processing- use of different softwares available in the market.

OUTCOME:
• The student shall acquire through working knowledge of modern surveying equipment such as Total Station and GPS so that they will be able to solve all surveying problems faced by our Country.

TEXTBOOKS:

REFERENCES:

GI 8551 GEOPHYSICAL INFORMATION SYSTEM L T P C 3 0 0 3

OBJECTIVES:
• To introduce the fundamentals and components of Geographic Information System
• To provide details of spatial data structures and input, management and output processes.

UNIT I  FUNDAMENTALS OF GIS  9

UNIT II  SPATIAL DATA MODELS  9

UNIT III  DATA INPUT AND TOPOLOGY  9

TOTAL: 45 PERIODS

Attiried

Safari

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UNIT IV DATA QUALITY AND STANDARDS
Data quality - Basic aspects - completeness, logical consistency, positional accuracy, temporal accuracy, thematic accuracy and lineage – Metadata – GIS Standards – Interoperability - OGC - Spatial Data Infrastructure

UNIT V DATA MANAGEMENT AND OUTPUT
Import/Export – Data Management functions- Raster to Vector and Vector to Raster Conversion -Data Output - Map Compilation – Chart/Graphs – Multimedia – Enterprise Vs. Desktop GIS- distributed GIS.

OUTCOME:
• This course equips the student to have basic knowledge about the GIS its structure, quality and standards.

TEXTBOOKS:

REFERENCE:

GI 8751 DIGITAL CADASTRE
L T P C
3 0 0 3

OBJECTIVES:
• To introduce the students to the cadastral survey Methods and its applications in generation of Land information system. Cadastral surveys are those classes of land surveys which are executed for the purpose of systematically recording the land rights, producing register of land holdings or an inventory of land areas, land use and determine land tax.

UNIT I INTRODUCTION

UNIT II METHODS OF SURVEYING

UNIT III MAINTENANCE AND MEASUREMENTS
UNIT IV PHOTOGRAMMETRIC METHODS
Photogrammetry for cadastral surveying and mapping - Orthophoto map – Quality control measures - Organisation of cadastral offices – international scenario.

UNIT V MAPPING PROCEDURES AND LIS

TOTAL : 45 PERIODS

OUTCOMES:
• The courses give the knowledge about Land Record System and computational procedure for modernization of the same.
• The students will be in position to understand the Government procedure in Land Record Management.

TEXTBOOKS:

REFERENCES:
2. Alias Abdul Rahman, Siyka Zlatanova,Volker Coors, Innovations in 3D geo information systems